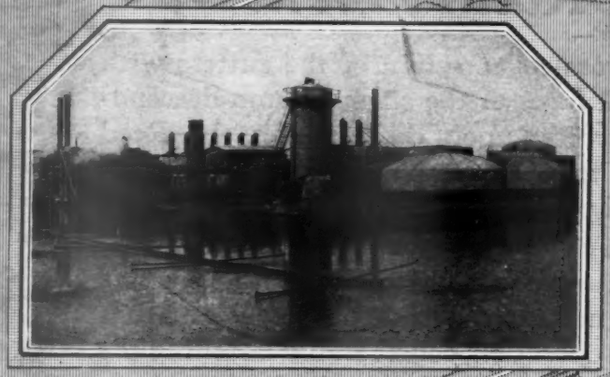
Standardization Number 15 Cents a Copy

The OIL and GAS JOURNAL

PRODUCING REFINING MARKETING

Published Every Thursday TULSA, OKLAHOMA, SEPTEMBER 22, 1927 $6.00 a Year

Cleveland John Library
SEP 2 1927



From a small tank builder supplying equipment to a limited area, Graver has grown with the Oil Industry in **70** years to an organization which is now serving every branch of the Industry (producing, refining and marketing)—domestic and foreign.

Today Graver's work is not confined to steel plate alone, but includes the engineering, development and design of equipment and plants together with the financing of Graver built installations.

Such a growth would be impossible were it not for the confidence inspired by satisfactory associations with the Industry.

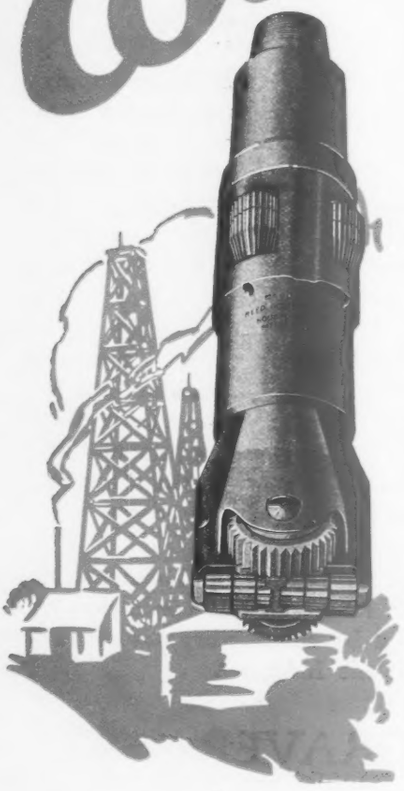
GRAVER Corporation Founded 1857
EAST CHICAGO, INDIANA

Advertisers' Index on Page 49 Table of Contents on Page 50

A Few Years Ago ~

A Revolutionary Innovation In Rock Drilling

Today ~



A Necessary Part of the Drilling Equipment in any Rotary Field ~

The cross-roller action of the cutters with the full force of the slush column descending directly upon them makes the Reed Rock Bit a tool that will penetrate with ease even the hardest rock.

The finest of alloy steels—carefully machined and properly heat treated—give this bit the necessary hardness to withstand continued operation, considerably lessening the "time out" generally required for replacement of the quickly worn out cutting edge of ordinary bits.

By increasing the footage rate while the bit is at the bottom of the hole, by cutting down on "time out" for changing bits, and by always making a *full-gauge hole,* the Reed Rock Bit plays an important part in reducing footage cost when drilling in hard rock.

Reed Rock Bits

Reed Roller Bit Company

HOUSTON LOS ANGELES

The ADVERTISERS' INDEX

A

Acme Fishing Tool Co. 268-269
Ajax Iron Works 190-191
Ajax Rope Co. 402
Allegheny Steel Co. 336
Allis Chalmers Mfg. Co. 136-I
Aluminum Co. of America 392
Amarillo Abstract Co. 392
Amarillo Hotel 392
American Cable Co., Inc. 259
American Car & Foundry Co. 313
American Hammered Piston Ring Co. 228
American Manganese Steel Co. 11
American Radiator Co. 233
American Roller Bearing Co. 403
American Rolling Mill Co. 5
American Schaeffer & Budenberg Corp. 292
American Sheet & Tin Plate Co. 392
American Spiral Pipe Works 392
American Telephone & Telegraph Co. 392
American Well Works 392
Anderson Prichard Oil Corp. 374
Andrews Steel Co. 15
Arco Company, The 1-6
Armstrong Bros. Tool Co. 407
Askania Werke, A. G. 299
Association of Natural Gasoline Mfgrs. 392
Athey Truss Wheel Co. 392
Atlas Royalties Co. 272-J
Austin Co. 392
Axelson Machine Co. 179

B

B. & A. Specialty Co. 244
Baash-Ross Tool Co. 333
Babcock & Wilcox Tube Co., The 377
Badger, E. B., & Sons, Co. 118
Baker Casing Shoe Co. 148
Baker-Lockwood Mfg. Co. 315
Baldwin Chain & Mfg. Co. 45
Barber Asphalt Co. 392
Barber-Greene Co. 335
Barco Manufacturing Co. 253
Barnickel, Wm. S., & Co. 33
Barnsdall Refineries, Inc. 250-251
Barrett, G. E. & Co. 404
Bartlesville Supply Co. 237
Beaumont Iron Works Co. 392
Becker Specialty Co. 392
Benjamin Electric Mfg. Co. 392
Bessemer Gas Engine Co. 203
Bethlehem Steel Co. 392
Biggs Boiler Works Co. 392
Bignall & Keeler Machine Works 379
Blaw-Knox Co. 392
Borden Co. 238
Bovaird Supply Co., The 222-223
Braun, C. F., & Co. 160-161
Bristol Co. 388
Broderick & Bascom Rope Co. 373
Brooks Engineering Corp. 392
Brown, Arthur C. 406
Brown Instrument Co. 7
Brownell Co. 396
Buckeye Traction Ditcher Co. 136-M
Buckner Process Co. 384
Buda Co. 154
Buffalo Bolt Co. 249
Buffalo Gasolene Motor Co. 47
Burns Tool Co. 392
Burt Corp. 297
Burt Mfg. Co. 386
Butler Mfg. Co. 44
Butler Portable Steam Hammer Co. 77
Byron Jackson Pump & Mfg. Co., Inc. 46

C

California Pipe Line Machine Co. 380
Cameron Iron Works 317
Cameron Tool & Supply Co., The 326
Campbell, J. A. 329
Canadian Pacific Railway Co. 392
Carbondale Machine Co. 392
Celite Products Co. 324
Central Alloy Steel Corp. 395
Central Tube Co. 400
Chain Belt Co. 75
Champion Machine & Forging Co. 392
Chaplin-Fulton Mfg. Co. 398
Chapman Valve Mfg. Co. 392
Chestnut & Smith Corp. 156-157
Chicago Bridge & Iron Works 93
Chicago Pneumatic Tool Co. 116-117
Chicago Steel Fdy Co. 333
Chisholm-Moore Mfg. Co. 391
Clark Bros. Co. 174-175-234-235
Classified Wants 340-341-344
Climax Engineering Co. 95
Columbian Rope Co. 392
Columbian Steel Tank Co. 184-185
Columbia Forge & Iron Co 392
Continental Motors Corp. 392
Continental Supply Co. 121-123-125-127-129-131
Cook Motor Co., The 392
Cooper, C. & G., Co. 78-79
Crane Co. 199
Crane Packing Co. 392
Crescent Belt Fastener Co. 392
Crowe Central Petroleum Corp. 109
Crucible Steel Co. of America 99

D

D. & B. Pump & Supply Co. 369
Darling Valve & Mfg. Co. 262
Dart, E. M., Mfg. Co. 392
Davis, G. M. Regulator Co. 246
Dayton Pipe Coupling Co. 392
Dearborn Chemical Co. 272-I
De La Vergne Machine Co. 392
Delta Electric Co. 36
Detex Watchclock Corp. 392
Detroit Graphite Co. 392
Diamond Drill Carbon Co. 404
Dixon, Joseph, Crucible Co. 392
Donovan Boiler Works, Inc. 248
Dresser, S. R., Mfg. Co. 61
Dunn Mfg. Co. 65
DuPont de Nemours & Co., E. I., Inc. 392

E

Eagle-Picher Lead Co. 3
Eastern Torpedo Co. 392
Edward Valve & Mfg. Co. 18
Elliott Core Drilling Co. 336
Empire Refineries, Inc. 392
Emsco Derrick & Equipment Co. 300-301
Ethyl Gasoline Corp. 392
Exchange National Bank 272-M

F

Fairbanks-Morse & Co. 392
Federal Supply Co. 27
Fenwick-Reddaway Mfg. Co. 392
Fernholtz Machinery Co. 400
Fisher Governor Co. 361
Foamite-Childs Corp. 397
Fohs, F. Julius 392
Foos Engine Co. 392
Ford Chain Block Co. 380
Foster-Hoefer Corp., The 3-1
Foster Petroleum Corp. 385
Foster Wheeler Corp. 34-345
Foxboro Co., Inc., The 399
Francis, Bro. & Co. 396
Franklin Valveless Engine Co. 196-197
Frick-Reid Supply Co. 30

G

Gallagher Co. 112
Gardner-Denver Co. 392
Garlock Packing Co. 371
Gasoline Recovery Corp. 367
Gaso Pump & Burner Mfg. Co. ..... 286-287-Inside Back Cover
General American Tank Car Corp. 392
General Asbestos & Rubber Co. 368
General Electric Co. 4
Gilbert & Barker Mfg. Co. 392
Goodrich, B. F., Rubber Co. 167
Goodyear Tire & Rubber Co. 392
Gott, H. P., Mfg. Co. 400
Goulds Pumps, Inc. 387
Graham Brothers 270
Graver Corp ..... Front Cover
Gray Processes Corp. 392
Greenspon's, Joseph, Sons, Iron & Steel Co. 272-E
Griscom-Russell Co. 10
Guiberson Corp. 170-171
Gulf Refining Co. 392
Gustin-Bacon Mfg. Co. 319

H

Halliburton, Erle P., Co. 257
Hallibu.ton Oil Well Cementing Co. 392
Harrisburg Pipe & Pipe Bending Co. 392
Haynes Stellite Co. 221
Hazard Wire Rope Co. 81
Heppenstall Forge & Knife Co. 390
Hercules Motors Corp. 392
Hercules Tool Co. 136-P
Heydrick Mapping Co. 406
Hill, Hubbell & Co. 207
Hills-McCanna Co. 392
Hinde.liter Tool Co. 32
Homestead Valve Mfg. Co. 336
Hoover Steel Ball Co. 392
Hope Engineering & Supply Co. 212
Hopkins, Edwin B. 406
Hough, Charles N., Mfg. Co. 392
Hoyt Metal Co. 389
Hughes Tool Co. ..... Back Cover
Humble Oil & Refining Co. 392
Hunt, Robert W., Co. 392

I

Imperial Belting Co. 390
Imperial Brass Mfg. Co., The 392
Imperial Royalties Co. 392
Indiana Truck Corp. 215
Ingersoll-Rand Co. 136-C
International Derrick & Equipment Co. 133-134-135-136
International Harvester Co. of America 392
International Nickel Co. 392
International Petroleum Exposition 392
International Supply Co. 150-151
Iron King Mfg. Co. 389

J

Jackson Engineering & Equipment Co. 298
Jarecki Mfg. Co. 392
Jefferson Union Co. 239
Jensen Brothers Mfg. Co. 392
Johns-Manville Corp. 295
Jones, J. Edward 392
Jones, S. M., Co. 189

K

Kaw Steel Construction Co. 13
Kellogg, M. W., Co. 272-A
Kelly, John Eoghan 406
Kelly, Kork 406
Kennedy Valve Mfg. Co. 43
Kerotest Mfg. Co. 193
Keuffel & Esser Co. 392

L

Landis Machine Co. 153
Larkin & Co. 16
Layne & Bowler Co. 392
Leader Iron Works 392
Leidecker Tool Co. 376
Leschen, A., & Sons, Rope Co. 41
Lientz, B. P., & Co. 392
Lincoln Electric Co. 392
Linde Air Products Co. 1

L

Link-Belt Co. 393
Lone Star Gas Co. 136-J
Longyear, E. J., Co. 392
Lorraine Corp., The 385
Lubrikup, Co., Inc. 392
Lucey Mfg. Corp. 405
Ludlow Valve Mfg. Co. 211
Ludlow-Saylor Wire Co., The 200
Lufkin Fdy. & Machine Co. 242-243
Lufkin Rule Co. 392
Lunkenheimer Co. 23

Mc

McCord Radiator & Mfg. Co. 254-255
McEvoy, J. H., & Co. 332
McGregor Working Barrel Co. 398
McIntosh & Seymour Corp. 361
McKee, Arthur G., & Co. 136-F 136-G

M

M. & M. Mfg. Co., The 24
Macwhyte Co. 392
Madison-Kipp Corp. 392
Magnolia Petroleum Co. 392
Maloney Tank Mfg. Co. 318
Manzel Brothers Co. 303
Marion Machine Fdy. & Supply Co. 70-71
Marsh Gauge Pole Co. 396
Mason Regulator Co. 302
Master Builders Co. 25
Mathieson Alkali Works, Inc. 392
Maverick, Phillip 406
Merco Nordstrom Valve Co. 304
Metric Metal Works 392
Mid-Continent Oil & Gas Association 325
Mid-Continent Petroleum Corp. 105
Midwest Piping & Supply Co. 21
Miller Improved Gas Engine Co. 29
Mission Sales Co. 321
Moon Mfg. Co. 392
Moore, Lee C., & Co., Inc. 145-146
Morse Drop Forging Co. 392
Munn & Co. 406
Myers, F. E., & Bro., Co. 402

N

National Carbon Co., Inc. 1
National Lead Co. 392
National Petroleum Engineering Co. 404
National Pigments & Chemical Co. 186
National Supply Co. 208-209
National Tank Co. 331
National Tank Seal Co. 88
National Transit Pump & Machine Co. 73
National Tube Co. 392
National Turnbuckle Derrick Co. 281
Neilan Schumacher & Co. 349
Newton Process Mfg. Co. 59
New Way Motor Co., The 392
Norris Brothers, Inc. 337
Norris, W. C. 14
North American Car Corp. 392
Northern Fire Apparatus Co. 392
Novo Engine Co. 392
Nuttall, R. D., Co. 266
Nye Tool & Machine Works 392

O

Oakite Products, Inc. 330
O'Brien Steel Construction Co. 407
Ohio Injector Co., The 272-B
Oil City Iron Works (Corsicana) 392
Oil City Iron Works, Inc. (Shreveport) 320
Oil Conservation Engineering Co. 20
Oil Country Specialties Mfg. Co. 392
Oil Insurance Association 316
Oil Well Supply Co. 91
Oklahoma Contracting Co. 293
Oklahoma Gas & Electric Co. 392
Oklahoma Portland Cement Co. 314
Oxweld Acetylene Co. 1

P

Page Steel & Wire Co. 372
Paige & Jones Chemical Co., Inc. 363
Parkersburg Machine Co. 375
Parkersburg Rig & Reel Co. 96
Patrick, R. S. 383
Pattin Brothers Co. 42
Pelican Well Tool & Supply Co. 392
Penberthy Injector Co. 383
Petroleum Appliance Co. 392
Petroleum Iron Works Co. 382
Pforzheimer, Carl H., & Co. 394
Philadelphia Gear Works 82
Phillips Petroleum Co. 136-D
Philtower Building, The 28
Pittsburgh-Des Moines Steel Co. 139
Pittsburgh Equitable Meter Co. 19
Pittsburgh Pipe Coil & Bending Co. 392
Pittsburgh Steel Products Co. 392
Pilbrico Jointless Firebrick Co. 347
Portable Rig Co. 308
Powell, William, Co. 173
Power Mfg. Co. 231
Power Piping Co. 328
Power Plant Equipment Co. 392
Pratt & Whitney Co. 100
Prescott Co., The 291
Prest-O-Lite Co., Inc., The 1
Pure Oil Co. 8
Pyle National Co. 394

Q

Quaker City Rubber Co. 392

R

Ratigan, J. P., Co. 374
Reading Iron Co. 224
Reading Steel Casting Co., Inc. 392
Reed & Cole 406
Reed Roller Bit Co. ..... Inside Front Cover
Regan Forge & Engineering Co. 347

R

Reid, Joseph, Gas Engine Co. 227
Reo Motor Car Co. 143
Republic Iron & Steel Co. 392
Republic Supply Co. 38
Ridge Tool Co. 392
Riehle Bros. Testing Machine Co. 392
Riter-Conley Co. 402
Robinson Orifice Fitting Co. 265
Rock Island Plow Co. 359
Roots, P. H. & F. M., Co. 392
Ross-Meehan Foundries 392
Roxana Petroleum Corp. 401
Ryerson, Joseph T., & Son, Inc. 402

S

Safety Gas Main Stopper 392
Safety Pulling Machine Co. 392
Shaffer, J. E., Co. 392
Shaffer Tool Works 392
Shaw, S. F. 406
Sheffield Steel Corp. 392
Sinclair Refining Co. 351
Sivyer Steel Casting Co. 9
Skelly Oil Co. 272-N
Skinner, M. B., Co. 404
Smith, A. O., Corp. 17
Smith Separator Co. 140-141
Smooth-On Mfg. Co. 392
Sonner, P. J., Gas Burner Co. 272-F
South Chester Tube Co. 136-N 136-O
Southern Cornice Works 392
Southern Mill & Mfg. Co. 338
Southwestern Engineering Corp. 282-283
Spang & Co. 37
Spang, Chalfant & Co., Inc. 366
Spence Machine Co. 392
Standard Rail & Steel Co. 322
Stanley Belting Co. 2-4
Star Drilling Machine Co. 357
Staytite Co., The 3-3
Stayton, Geo. K. 406
Stearns-Roger Mfg. Co. 392
Stefco Steel Co. 87
Steiner, George 406
Strom Steel Ball Co. 378
Strandburg-McGreevy & Co. 388
Sullivan Co., The 273
Sullivan Machinery Co. 367
Sweet, Wm. J., Foundry Co. 384

T

Taubman Supply Corp. 392
Taylor Instrument Companies 392
Templeton, Kenley & Co., Ltd. 406
Texas Company, The 240
Texas Creosoting Co. 12
Texas Pacific Coal & Oil Co. 366
Texas Steel Co. 103
Timken Roller Bearing Co. 355
Tipe Engine Works 40
Titusville Forge Co. 327
Titusville Iron Works 48
Toledo Pipe Threading Machine Co. 159
Traction Machine Co., The 334
Trimont Mfg. Co. 6
Trumble Gas Trap Co. 392
Tulsa National Bank 39
Tulsa Sheet Metal Co. 392
Tulsa Trust Co. 39
Twin City Oil Co. 392
Twin Disc Clutch Co. 392

U

United Iron Works, Inc. 2
United States Cast Iron Pipe & Fdy. Co. 219
United States Industrial Diamond Corp. 404
Universal Oil Products Co. 67

V

Veeder Supply Co. 339
Victaulic Co. of America 217
Victor Balata & Textile Belting Co. 392
Vogt, Henry, Machine Co. 392
Vulcan Steel Tank Corp. 288

W

Wagner Electric Corp. 194
Wailes Dove-Hermiston Corp. 236
Walsh & Weidner Boiler Co. 392
Walworth Co. 69
Warren Petroleum Co. 323
Washburne, Chester W. 406
Waukesha Motor Co. 168
Westcott & Greis 274-275-276-277-278-279
Westinghouse Electric & Mfg. Co. 31
Whealton & Townsend, Inc. 26
Wheeler, C. H., Mfg. Co. 63
Wheeling Steel Corp. 392
Wickwire Spencer Steel Co. 392
Wico Electric Co. 85
Widdell Engineering Co. 136-F 136-G
Williams, J. H., & Co. 392
Williamsport Wire Rope Co. 392
Williams Tool Corp. 392
Wilson Oil Tools Corp. 285
Wilson-Snyder Mfg. Co. 370
Winkler-Koch Engineering Co., The 204
Witte Engine Works 392
W-K-M Company, Inc. 392
Worthington Pump & Machinery Corp. 110-111
Wright Mfg. Co. 163-164

Y

Yale & Towne Mfg. Co. 392
Young Engine Corp. 35

Z

Zero Hour Torpedo Co. 381
Zwetsch Heinzelmann & Co. 392

The OIL and GAS JOURNAL

PRODUCING REFINING MARKETING

VOL. 26. NO. 18 TULSA, OKLAHOMA, SEPTEMBER 22, 1927

The Petroleum Publishing Co. Copyright, 1927, by

TABLE OF CONTENTS

SPECIAL ARTICLES

Production Decline Continues Slowly, *By James McIntyre* 51
Organize Study of Gas Conservation, *By T. R. Ingram* 53
Pecos Proration Assured of Success, *By C. D. Lockwood* 53
Petroleum Exposition Opens Saturday, *By James McIntyre* 54
Responsibility Is Put Up to Field, *By Capt. J. F. Lucey* 55
Contact Filtration of Lubricants, *By J. M. Wadsworth* 56
N.P.A. Anniversary Notable, *By N. O. Fanning* 57
Principles of Simplification, *By Edwin W. Ely* 57
Developments in Petroleum Refining, *By T. G. Delbridge* 58
The Big Problem of the Day *(Editorial)* 60

A.P.I. STANDARDIZATION

Specifications of Vast Importance, *By T. A. Dines* 55
One Case Where Industry Got Together, *By W. T. Anderson* 106
Accomplishments of Standardization, *By J. Edgar Pew* 108
Five Years' Standardization Progress 113
Scope of A.P.I. Standardization *(Diagram)* 114-115
Functions of Standardization Division, *By Carl A. Young* 119
Purchasing Agent's Viewpoint, *By G. A. Tompson* 122
Standardization to Eliminate Waste, *By W. G. Skelly* 122
Automotive Industry Standardization, *By H. L. Horning* 124
Standardization Will Aid Oil Men, *By E. W. Clark* 124
Standardization in California, *By Edwin Higgins* 126
Progress in Wire Lines and Cordage, *By C. C. Sharpenberg* 128
Rig and Derrick Standardization, *By W. W. Fondren* 136-A
Importance of Uniform Gauges, *By H. W. Fletcher* 136-L
Problem of Selecting Sucker Rods, *By Robert N. Burnett* 137
Better Material Result of A.P.I. Work, *By W. S. Farish* 138
Belting Committee Had Difficult Task, *By A. H. Riney* 138
Care of Belting Important, *By David L. Trax* 144
Inception and Progress of Standardization, *By H. J. Lockhart* 147
Specifications Completed on Pipe, *By J. Edgar Pew* 155
Standard Steel Tanks, *By Ralph J. Reed and Mark W. Daw* 169
Rotary Drilling Accomplishments. *By R. A. Wilson* 177
Sandardization of Boilers, *By S. J. Dickey* 188
Cable Tool Joint Standards, *By Thomas Fleming. Jr.* 218
Standardization Committees 229
Little Complaint of Standards, *By Chester W. Brown* 230
Standardization Proper Adjustment, *By A. C. McLaughlin* 232
Pumping Equipment and Engines, *By T. E. Swigart, J. R. Suman and P. B. Roberts* 267
Purchasing Department to Adopt Standard, *By S. H. Keoughan* 306
Official List of A.P.I. Monogram Licensees 312

A.P.I. SPECIFICATIONS

Wire Lines and Manila Cordage 128
Rigs and Derricks 136-B
Belting 144
Rig Irons 149
Tubular Goods 162
Steel Storage Tanks 172
Transmission Standards 178
Oil Field Boilers 192
Cable Drilling Tool Joints 220
Line Shafts 245
Rotary Drilling Taper Joints 248
Steel and Iron Pipe 252
Working Barrels 272-C
Sucker Rods 272-G
Internal Combustion Engines 272-L
Miscellaneous Pumping Equipment 272-O
Miscellaneous Rotary Standards 296

FIELD OPERATIONS

North and West Texas, *By C. D. Lockwood* 62
Late Fields 62
Texas Panhandle, *By J. H. Dameron* 64
Oklahoma, *By J. L. Dwyer* 65
Kansas, *By J. L. Dwyer* 65
North Louisiana-Arkansas, *By Neil Williams* 68-72
Southwest Texas, *By B. D. Stevenson* 74
Gulf Coast. *By Staff Correspondent* 76
Rocky Mountain Area, *By Tolbert R. Ingram* 80
California, *By L. P. Stockman* 83
Canada, *By Victor Lauriston* 84
Central West, *By Whit* 85
Kentucky-Tennessee, *By Whit* 85
Pennsylvania-West Virginia, *By D. S. Wakenight* 89
Michigan, *By Whit* 89

REFINING AND MARKETING

Oklahoma Market More Optimistic, *By W. T. Ziegenhain* 52
Changes in Treating Light Oils. *By Dr. C. K. Francis* 201
Many Sources of Motor Fuel. *By J. C. Morrell and Gustav Egloff* 202
Many Type Tanks for Refineries, *By W. T. Ziegenhain* 205
Perfect New Method to Remove Coke, *By H. L. Kauffman* 206
New Principle in Contact Filtration 210
Improvement in Laboratory Apparatus, *By C. E. Kern* 213
New Methods in Gasoline Manufacture. *By C. O. Willson* 214
Comparison of Towers in Refining, *By Fred C. Koch* 216
Chicago Market Tone Reported Better, *By J. B. Waldo* 342
Eastern Prices Unchanged, *By N. O. Fanning* 344
Refining and Marketing News 346
Refinery and Crude Prices 348-349
Tank Wagon Quotations 350
Technical Questions Answered, *By Dr. C. K. Francis* 353
Plant Operators' Page 360
Of Interest to Sales Departments 362
Short Talks on Specifications, *By W. T. Ziegenhain* 362
Heat of Solution of Paraffin Wax, *By F. W. Sullivan, Jr., W. J. McGill and August French* 364

ARTICLES OF GENERAL INTEREST

Men Known in Oildom and Personals 90
Equipment and Supplies 92
Natural Gas Developments 94
Steel Trade Remarkably Steady, *By B. E. V. Luty* 329
Classified Want Advertisements 340-341-344
Oil Securities Decline 352
Petroleum Resources of Bolivia, *By Ernesto Barth* 404
Crude Petroleum Satistics 408

BE A REGULAR READER

The OIL and GAS JOURNAL Tulsa, Okla.

You are hereby directed to mail The Oil and Gas Journal to me for.....year. Enclosed find remittance $.....

Classify my interests as checked by me.

.....Producing .....Refining
.....Equipment .....Marketing

Name .....
Address .....
City .....

$6 a Year
$3 6 Months

Refinery Section Starts on Page 342

Production Decline Continues Slowly

Highest daily average estimated production in 1926, week ended Dec. 25, 2,385,139 bbls. Lowest in 1926, January 30, 1,915,960 bbls.

Output Down to Where it Was Last May. Yates Area Well Shows Big Percentage of Sulphur Water

By James McIntyre

Highest daily average estimated light oil production in 1926, week ended Dec. 25, 1,797,349 bbls. Lowest in 1926, Jan. 30, 1,371,600 bbls.

While crude oil production in the United States is yet above the 2,500,000-barrel mark, the average daily output has fallen from a high of 2,587,105 barrels as of the week ending July 30, and is back to a level reached early last May. In the past week production fell 8,301 barrels a day and the previous week it fell 13,770 barrels a day. Seminole, Oklahoma, the largest of fields, dropped last week to 426,385 barrels a day, over 100,000 barrels a day under its peak output in the latter days of July.

The Yates Pool in Pecos County, Texas, was extended three-quarters of a mile westerly by the completion of a well starting at 30 barrels an hour. A well in Crockett County across the river from Pecos County, started at 600 barrels an hour, but on Saturday, while pinched to 900 barrels a day, it began to show sulphur water alarmingly and when the water increased to 32 per cent of the fluid produced, the well was entirely shut in. Just what this indicates is debatable. A big well was not expected in this part of the field and when it showed a production at the rate of 14,000 barrels a day it was a great surprise. Its subsequent performance has given rise to the thought that hydrostatic pressure is responsible for the large initial production of Yates Pool wells and if this is correct the ultimate production estimates may have to be revised downward. The performance of this Crockett County well has created a feeling among Texas operators that the Yates Pool is not as great a menace as it was thought to be.

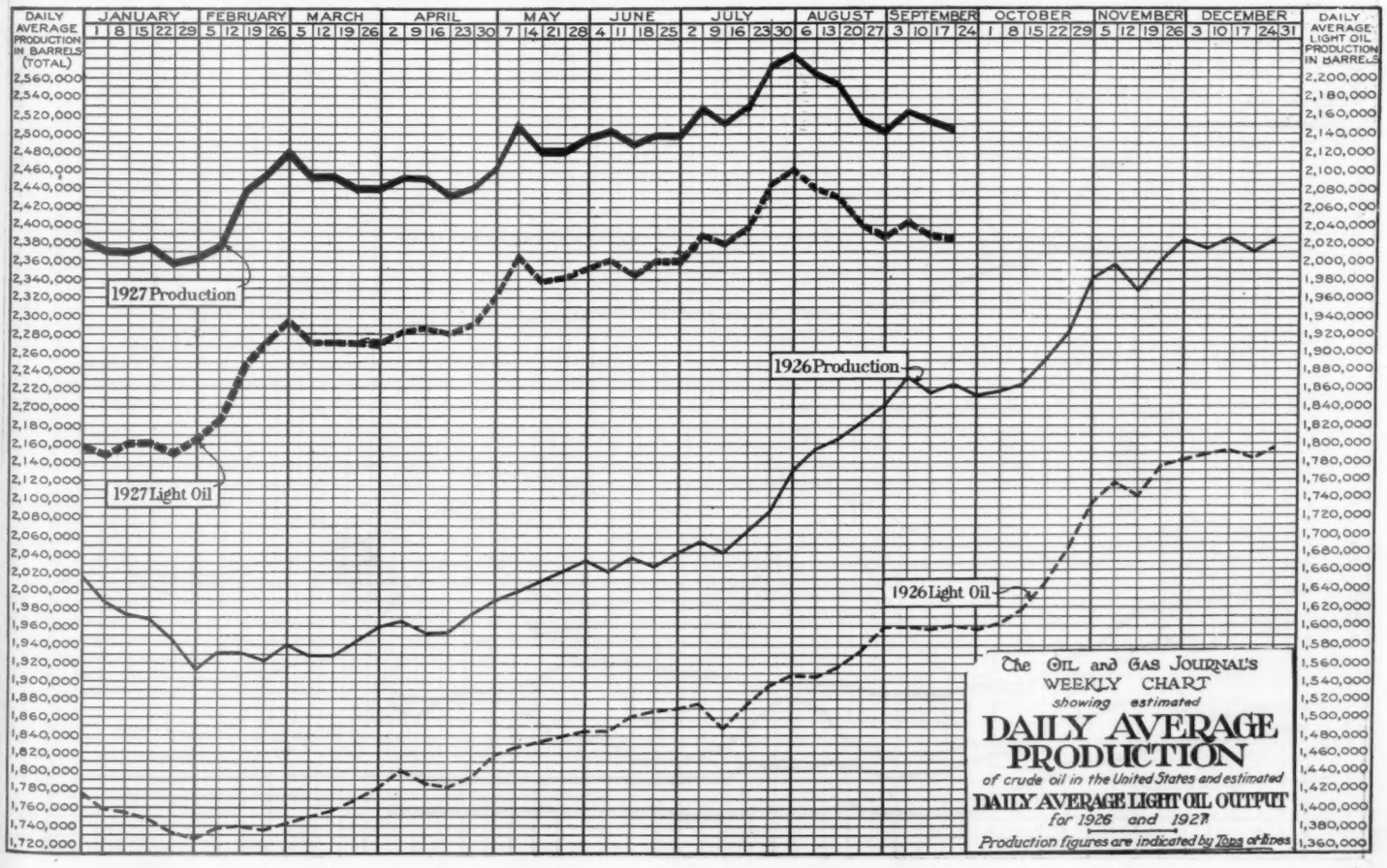
Big wells in the Spindletop, Pierce Junction and Blue Ridge in the Texas Gulf Coast featured the news of the week from that area. A new well in the Dale Pool, Caldwell County, Texas, gauged 105 barrels in 30 minutes on Monday. The Seal Beach Field in California showed evidence of a decline in the latter days of last week and the important Potrero wildcat of the Associated Oil Company was a disappointment and will be deepened. In the Pleasant Hill district, northern Sabine Parish, Louisiana, a wildcat started off at 97 barrels an hour. Deepening the Roxana Petroleum Corporation's recent big well in the Cockrell Pool, Hutchinson County, Texas, increased its production to 8,500 barrels a day.

PRODUCTION IN THE UNITED STATES

Estimated daily average production of light and heavy gravity oil in the United States for week ended September 17 and a comparison with the previous week follows:

	Sept. 17		Sept. 10	
	Light	Heavy	Light	Heavy
Oklahoma—				
Tonkawa	18,665	.....	19,015	.....
Burbank	36,115	.....	36,430	.....
Other Osage Fields	31,040	.....	31,180	.....
Cushing and Shamrock	21,235	.....	21,210	.....
Bristow and Eastern Bristow	24,983	.....	25,170	.....
Cromwell	12,950	.....	12,105	.....
Garber	10,915	.....	11,015	.....
Blackwell-Braman	9,235	.....	9,215	.....
Seminole	426,385	.....	436,910	.....
Wewoka	13,615	.....	13,805	.....
Northern Miscellaneous	110,582	.....	112,320	.....
Southern Fields	66,200	.....	65,470	.....
Total Oklahoma	781,920	.....	793,845	.....
North Louisiana	43,125	10,150	44,170	10,190
Arkansas	23,075	78,435	22,990	78,815
North Central Texas	155,382	.....	157,273	.....
West Texas	178,432	.....	168,148	.....
Texas Panhandle	97,475	.....	98,065	.....
East Central Texas	31,302	.....	31,422	.....
Kansas	105,180	.....	105,810	.....
Total Mid-Continent Area	1,415,891	88,585	1,421,723	89,005
Gulf Coast	.....	145,556	.....	147,280
Southwest Texas	.....	31,020	.....	31,310
Eastern	114,000	.....	114,000	.....
Rocky Mountain Area	72,957	.....	72,492	.....
California—				
Santa Fe Springs	40,000	.....	40,500	.....
Long Beach	91,000	.....	91,500	.....
Torrance	4,000	17,500	4,000	17,500
Huntington Beach	68,000	.....	68,000	.....
Dominguez	15,000	.....	15,000	.....
Rosecrans	8,250	.....	8,250	.....
Inglewood	21,000	12,500	20,000	12,500
Ventura Avenue	58,500	.....	58,000	.....
Seal Beach	67,000	.....	64,500	.....
Remainder of State	55,000	184,000	55,000	186,000
Total California	427,750	214,000	424,750	217,500
Total United States	2,030,598	479,161	2,032,965	485,095
Grand Total	2,509,759		2,518,060	

→ **Total Decrease, 8,301 Bbls.; Light Oil Decrease, 2,367 Bbls.** ←



Oklahoma Market More Optimistic

Advance in Higher Grades of Natural Gasoline Feature of Week. Fuel Oil Weak; Wax Improved

By W. T. Ziegenhain

Oklahoma refiners took a more optimistic view of the future refined oil market as refinery gasoline prices strengthened, with a large volume of material moving. Natural gasoline prices featured the market for the week with an advance of one-half cent for the higher grades. This advance may further strengthen the refinery gasoline price but in turn, the natural gasoline price is not expected to go much higher and remain there over any great period of time without an advance in the refinery gasoline price. Cheap natural gasoline has allowed refiners to use it in greater proportion than that normally blended and at times, when natural gasoline prices were from three-quarters to 1 cent below the refinery gasoline price, the only limitation in using from two to three times the normal amount was their ability to move the added volume. Kerosene continued to move at a good rate and there was but little available for resale, much of it going to the agricultural areas as tractor fuel.

Fuel oil remained weak with movement only fair. The lowering of the price on Smackover crude did not force the price downward but presented a pessimistic factor in the fuel oil market which pushed the possibility of any material advance in fuel prices further into the background.

Gas oil was unchanged over the week with very little added trading resulting from the better tone of the gasoline market, whereas the gas oil price ordinarily fluctuates with the gasoline price as its value as a cracking stock is changed.

Lubricants showed no change in prices and trading was normal in volume. Refiners feel the present prices on neutrals are the lowest they will go and, in general, expect the lubricant market to shape itself into a firmer position. Wax continued to move at a fair rate and the prices were generally higher. Betterment in the wax movement has been apparent for several weeks and although the price changes have come about very gradually, because of the large stocks previously accumulated, the market is continually gaining strength.

REFINED MARKET BAROMETER

A general improvement in the gasoline market east of the Rocky Mountains allowed refiners in these sections to view the future with a little more optimism. The rise in natural gasoline prices in the Mid-Continent featured the market. Reduction of Smackover crude 10 cents per barrel tended to discount any thought of improvement in the fuel oil market in the Mid-Continent while higher prices are reported along the Atlantic Coast. Kerosene continued to be in good demand and commanded higher price in the East. Lubricant prices strengthened in the Gulf Coast area, and this fact gave strength to the Mid-Continent market. Wax was in good demand and was generally traded at prices slightly above those of last week. California did not share in the general advancement, and both refinery and natural gasoline prices were reduced. There was no change in the balance of the California market.

Mid-Continent—Gasoline advanced one-eighth cent, with movement good. Natural gasoline featured the market with material tight at prices one-half cent above those of last week. There is plenty of material held in stocks and production is high, but manufacturers expect still higher prices. Fuel oils remained weak. Kerosene and lubricants slightly improved. Wax stronger.

Atlantic Seaboard—Gasoline prices unchanged with movement good. Kerosene remained steady, with some California and Mid-Continent kerosene being offered. Fuel oil, gas oil and lubricants show no change. Wax is improved.

Pennsylvania—Gasoline prices were generally higher and consumption continued at a high rate. The lighter grades of kerosene also showed price advancements. Gas oil and light fuel oil strengthened materially. Lubricants remained unchanged and wax showed some improvement in demand.

Chicago—Gasoline stronger, with kerosene remaining in good demand. Distillate sales have increased, but still remain below expectations. Fuel prices show general weakness.

California—Both refinery and natural gasolines weakened and caused a slowing up of all buying. Kerosene and fuel oil was offered at slight fractions below last week's prices, but only a moderate amount of trading developed.

Oklahoma Fuel Oil Attractive

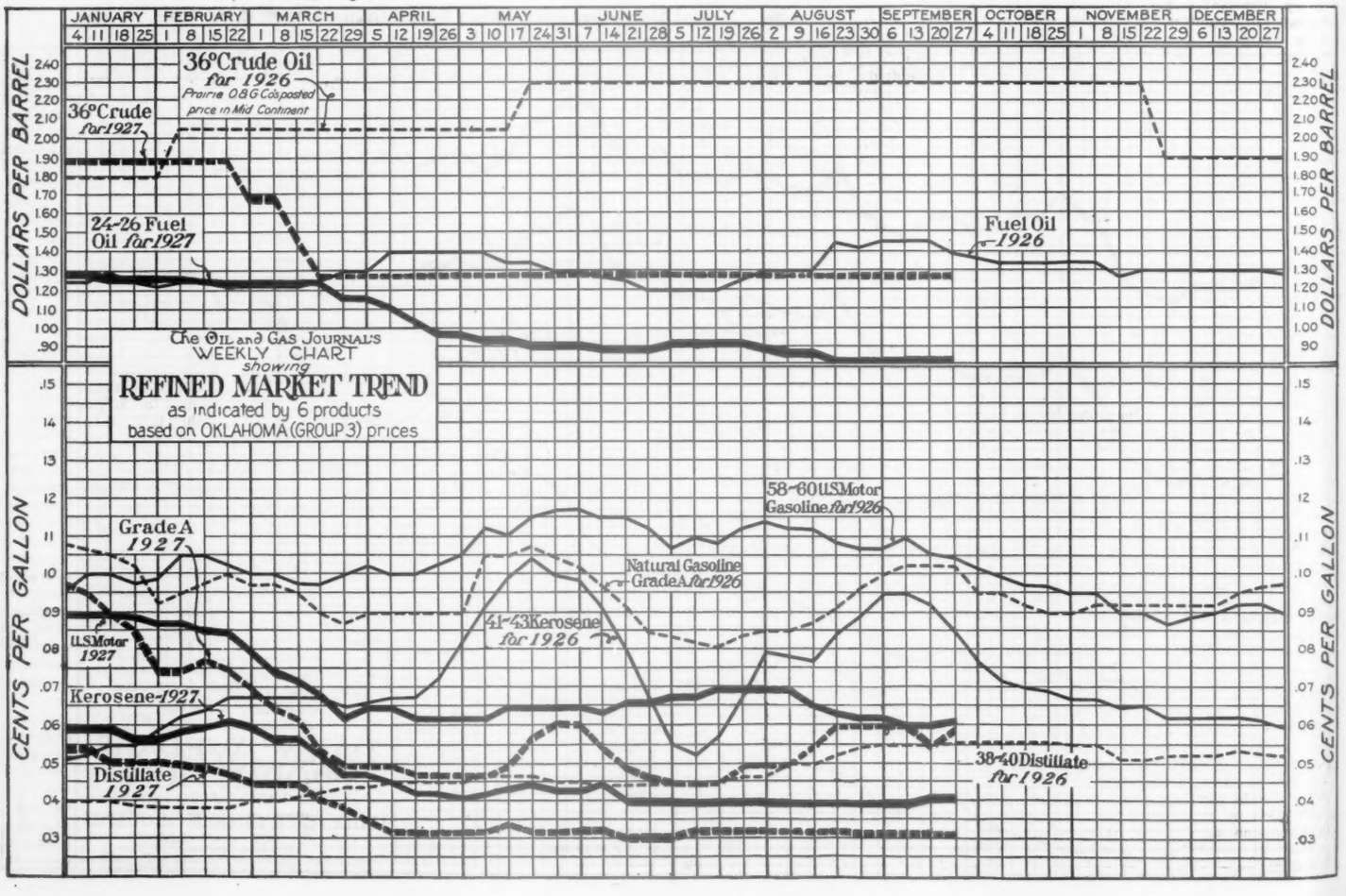
The posting of a 10-cent reduction on Smackover crude by the Louisiana Oil & Refining Co. on September 17 and on September 20 by the Standard Oil Co. of Louisiana had no effect on the fuel market in Oklahoma, and unless further reductions are posted in that field there is not much chance of any serious competition resulting in the Oklahoma fuel market. With low gravity Oklahoma fuel at 75 to 80 cents per barrel, and generally considered better for industrial uses because of its lower sulphur content, Smackover oil remains unattractive in the Chicago and surrounding industrial territory. Some purchasers do not object to the higher sulphur content of Smackover fuel and prefer it because of its low cold test and low flash.

The low cold test fuel is becoming more popular as the summer season closes. Some refiners are specializing in the sale of low cold test fuels, most of these being made as cracked fuels or blends of refinery and cracked fuel. As cracking becomes a bigger factor in the Mid-Continent operations, more of this low cold test fuel is available; and coupled with the ability of the users to handle heavy fuels, Oklahoma refiners are not witnessing any handicap in meeting competition from other sources on this point.

Gasolines and Naphthas

With gasoline prices generally one-eighth cent above those of last week, and movement continuing at a good rate, the market assumed a firmer tone than at any time in many months. Refiners were shipping from current production in many cases and were able to refuse

(Continued on Page 358)



Organize Study of Gas Conservation

Technical Subcommittee and Committee of Lawyers Decided Upon at Colorado Springs. To Begin at Once

By Tolbert R. Ingram

DENVER, Colo., Sept. 17.—The meeting of the Gas Conservation Committee of the American Petroleum Institute at the Broadmoor Hotel, Colorado Springs, adjourned after a three-days' sess on to meet again at Ponca City, Oklahoma, on October 17. E. W. Marland, president of the Marland Oil Co., is chairman of the committee.

The principal action taken was the adoption of a resolution creating a technical subcommittee, as follows:

Whereas, This committee has been created by the American Petroleum Institute and charged with the duty of devising and suggesting to the board of directors of the institute "such measures as will enable the industry, while continuing to meet the consumption requirements for petroleum and its products, to conserve in its natural state such reserves of petroleum as may not then be required for consumption." And, whereas, this committee's recommendations should be based on all the technical and scientific data that can be made available to it, be it resolved that the chairman of this committee be, and he hereby is, authorized and directed to appoint, or obtain the appointment, of a technical subcommittee to gather, collate and report back to this committee all available information, including the opinions of qualified scientists and engineers, regarding the importance of natural gas in the conservation and production of petroleum, and the best means for its most efficient utilization, and that the members of the American Petroleum Institute and of the petroleum industry in general be, and they hereby are, requested to co-operate in every reasonable manner with the technical subcommittee so created, by making available to it their pertinent data and such qualified men as can be of the greatest assistance.

Chairman Marland's Statement

After the meeting adjourned, Chairman Marland issued a statement for the committee which said in part:

"The problem of greatest concern to the industry and also one of greatest interest to the public and the nation is not the present overproduction of oil or even the uses to which oil is put. Consumption will catch up with production and essential uses will be determined.

"The problem of greatest interest to the industry and to the public is:

"How to bring about the most economical production of oil and gas—

"Meet the demands of consumption—and,

"Conserve for future requirements any unneeded supplies."

This division of the problem into three separate phases is looked upon as indicating the manner in which the committee is approaching the subject and the trend which its report will take. The methods by which these things are to be accomplished apparently proved to be the greatest difficulty for the committee and resulted in the decision to seek more information before preparing its final report. In addition to the members of the committee who attended the meeting, many of the oil companies sent their technical engineers and scientists, and much information bearing on the subject was discussed. It was pointed out by the committee in its statement that involved in the solution of the problem are many technical and highly-scientific problems of an intricate legal character, incuding the rights of private property in oil and gas.

Subcommittees Appointed

The technical subcommittee appointed is composed of petroleum engineers and scientists who were entrusted with the duty of assembling additional data on oil and gas conservation. Earl Oliver, of Ponca City, Okla., was made secretary of this subcommittee, which is composed of four subdivisions, each with a chairman. M. E. Lombardi, of San Francisco, was appointed chairman for the California division; Max W. Ball, of Denver, for the Rocky Mountain division; John R. Suman, of Houston, for the Texas division; and W. A. Haseman, of Ponca City, for the Oklahoma division.

Developments during the progress of the meeting indicated that the discussion upon technical features trended towards the question of unit operation of pools as one of the methods of bringing about the more economical production of oil and gas as well as the problem of conserving gas for use in lifting the oil. This, apparently, brought out some of the difficulties arising from present leasing and royalty practices, such as the checkerboarding of acreage, the splitting up of royalty interests into numerous fractions, and the division of acreage in such a manner as to increase the necessity for drilling wells that otherwise might not be required to meet consumption demands. This led to the appointment of the second subcommittee, the duties of which were outlined by the committee's statement as follows:

"A committee of lawyers entrusted with the duty of suggesting methods to be used by the industry in its effort to avoid some of the evils arising from our present leasing and royalty practices, which, in the light of the knowledge possessed by the industry today, are considered antiquated." The personnel of this committee was not announced pending selection of all the members.

The meetings of the committee were held behind closed doors so that there could be an unhampered discussion of all phases of the problems discussed while milling around for a common ground upon which all could stand, but it appears that there was one thought in the minds of all, and that was that the greatest benefits will arise out of self-regulation by the industry as far as that is possible. That means educating the oil men as to the nature of their problems and the necessity for greater co-operation in the industry. An exception was suggested that police powers may have to be invoked in the conservation of gas. The question of revising leasing and royalty practices is one that the committee is said to feel must be settled by the operators themselves, and such a course is looked upon as possible if the lessees become informed on the evils growing out of present methods and are offered a workable solution which can be put into effect with benefit to themselves and to lessors.

Invitations Issued

Invitations have been addressed to some 18 or 20 oil companies in Oklahoma and Kansas to participate, under the auspices of the American Petroleum Institute, in an organized study of the value of natural gas in the conservation and production of petroleum and the best means for its most efficient utilization. To save time in organizing the study, invitations from the regional chairmen appointed at the recent Colorado Springs meeting of the Gas Conservation Committee of the institute are being sent direct to those in each region who, it is thought, can contribute something worth while to this study instead of such invitations being sent through the headquarters of the American Petroleum Institute.

These letters state that a study of the problems developed that some changes in long-established practices of the industry might be found necessary to bring about the desired result. Pronounced differences of opinion have been held as to how these changes, if any, might be brought about. The conservation committee was authorized and instructed by the executive committee of the institute to take steps whereby a more comprehensive study and analysis of the problem might be made than had previously been undertaken; that in such analysis there should be made a comprehensive and complete study and compilation of technical data on the problem, and especially of the function of natural gas in the production of oil and the best engineering practice by which the same might be harnessed to that end. It was, of course, understood that these data should be compiled entirely free from previously-conceived opinions or controversial positions so that they may be permitted to point to logical conclusions. In other words, there should be made a complete analytical study of the data and facts as a basis on which might be predicated policies by the institute. The committee set about collecting such data preparatory to its meeting in Colorado Springs.

That meeting had a very excellent attendance. Perhaps at no other meeting of the industry to this date has there been such a completely frank and open discussion of the present knowledge or limitation of knowledge of the functions of natural gas in the production of oil as at this meeting—all of which developed the perhaps unanimous opinion that while natural gas is believed to play a very important part in the production of oil, yet remarkably little is known about its exact functions and the best means of utilization; also that it is highly important to the industry that a more thorough study be instituted and the facts therein developed be made available to guide the industry in its present stage of evolution.

Co-operation Essential

It was also recognized that because of the necessarily co-operative manner in which the application of gas to the production of oil must be handled that no particular advantage is attained to any one company in retaining to itself knowledge about the functions of gas, since the same could not be applied unless like knowledge and opinions are held by others whose co-operation is sought. This information differs, for instance, from knowledge of improved geological methods whereby one company might have advantages over another by keeping its information to itself. It appears clear that the greatest good to the individual company can be accomplished only in pro-

(Continued on Page 104)

PECOS COUNTY PRORATION PLAN VIRTUALLY ASSURED OF SUCCESS

By C. D. Lockwood

FORT WORTH, Tex., Sept. 17.—The proposed plan to prorate pipe line runs in Pecos County for the purpose of providing an equitable distribution of the field's limited transportation facilities and to prevent an excessive and wasteful drilling campaign met with further endorsement at the meeting of operators here Friday and is now virtually assured of success.

The gauges to determine potential production of each well, as provided under the terms of the agreement, will be taken September 28 it was decided at a meeting of the executive committee which was held in the office of W. A. Moncrief immediately following the producers' meeting. This committee, composed of M. E. Wagner of the Mid-Kansas Oil & Gas Co., W. A. Moncrief, vice president of the Marland Oil Co. of Texas, and Warner Clark of the California Co., will meet in the Yates Pool on the evening of September 27 and arrangements will be made to have a representative of every concern involved in the proration plan present when the individual well gauges are taken. It is planned to gauge every well for an hour under open flow conditions to determine its potential output. These individual gauges will then be added up and the potential production of the field determined in that way.

Fixing Production Fraction

The total daily capacity of the field's pipe lines will be divided by the total daily potential production of the wells, as determined by these hourly gauges and the result will be known as the production fraction. This fraction will be multiplied by the total potential production of each lease to determine the amount of oil which each lease will be entitled to run through the pipe lines. This amount will hold good for 15 days when another series of gauges will be taken.

A field secretary, or umpire, will be employed by the committee to handle the details involved in the execution of this plan but no definite decision has been made yet regarding the man for this position.

The Mid-Kansas Oil & Gas Co. has not actually signed the agreement at the time of Friday's meeting but Mr. Wagner, representative of the company, was enthusiastic over it and it is considered probable that the plan will receive official endorsement before the end of the week, or at least before the gauges are taken. Gulf Production Co. also has not actually signed the papers but has indicated its intention of abiding by the rules as formulated by the others.

No Changes Proposed

No changes in the proposed plan were offered at Friday's meeting and W. A. Moncrief, general chairman of the producers' committee, is enthusiastic over the prospects for success.

The pipe line capacity of the Yates Pool is expected to be around 60,000 bbls., comprising the Humble Pipe Line Co.'s new 8 inch line from the field to Kemper in Reagan County by way of the Powell Pool in Crockett County; the Illinois Pipe Line Co's new 8-inch from the field to Del Rio on the Southern Pacific; and the same concern's parallel 6 and 8-inch lines from the field north to McCamey on the Orient. However, the only outlet for the lines, with the exception of the Del Rio carrier is the Humble's combination 10 and 12-inch from Kemper to Ingleside (Corpus Christi) and only 30,000 bbls. of its 40,000-bbl. capacity will be available for Pecos County crude, the other fields in Crane, Upton and Winkler having considerable claim on part of it.

Plans for a new 10-inch line looping the Illinois Pipe Line Co.'s 8 inch to Del Rio, and the possibility of Roxana Petroleum Corp.'s construction of a line from the field of McCamey if the company's leases prove as productive as expected, will furnish considerable relief to operators later. Marland Oil Co.'s plans for a line may also materialize within a few weeks.

Petroleum Exposition Opens Saturday

Great Industrial Exhibit Will Continue Until October 1. Many New Features to Be Shown. Noted Men to Attend

By James McIntyre

When President Coolidge presses the button that will start the fourth International Petroleum Exposition in Tulsa next Saturday his action will at the same time revive the performance of the first oil well by throwing a stream of crude oil in the air from the the top of the replica of the Drake rig on the exposition grounds.

In order to give realism to the scene the oil will be from the same lease on which the Drake well was drilled near Titusville, Pa., in 1859, and will be from a well located about 50 feet from the original Drake well. Arrangements have been made with Titusville residents to ship a quantity of the crude to Tulsa.

Men who spent their childhood in the eastern oil country will well remember the cat tail parades they engaged in in their boyhood, and a cat tail parade will be staged on the opening day by old-timers on the grounds who will be provided with 60 cat tails picked from a spot near the Drake well and shipped to Tulsa for the purpose of reviving the ancient oil country custom. The cat tails will be soaked in crude oil taken from the Drake lease and set afire just at the time President Coolidge starts the show from the White House, which will be at 2 p. m. central time.

Largest Industrial Show

The fourth International Petroleum Exposition, in Tulsa, September 24 to October 1, will be the largest show yet held by the oil industry. A total of 250 exhibitors will display the latest tools, machinery, pipe and appliances used in the production, refining and marketing of petroleum and its products; the laying of pipe lines and the creation of storage facilities.

It will be an enormous exhibit of oil industrial supplies and a wonderful demonstration of the complexity of the oil business.

No other industry on earth could assemble such a multiplicity of essential material as will be found in the immense buildings and on the open display space in the exposition grounds.

The exposition will be held on a large ground on West Twenty-first Street, just off Harvard Avenue in Tulsa adjoining the Tulsa State Fair grounds. The grounds cover 40 acres but the grouping of the buildings has been done with the end in view of giving the exhibits all the room necessary and at the same time keeping them close enough together to make it convenient for exposition patrons to see everything without undue fatigue. There are no long tiresome walks from any one exhibit to another. The whole show will be within easy reach of all the many thousands of people in attendance.

Great Open Air Exhibit

The large exposition buildings form three sides of a quadrangle in the hollow of which the outdoor exhibits will be located. Already the seven derricks and their drilling or pumping equipment are in place and before the opening of the show numerous exhibits of engines, compressors, ditchers, tractors, etc., that make up the open air show, will be ready for operation. There will be two rotary drilling rigs, two standard drilling rigs and three rigs equipped for pumping, and all seven in active operation under gas engine, oil engine or electric power. One of the features of the outdoor show will be an exhibit of what is said to be the largest tank wagon made, the tank being 39 feet long by 9½ feet inside diameter.

The exhibit halls will present the gay and festive appearance which has characterized the show since its inception five years ago. All the furnishings have been repainted and decorated and a profusion of bunting, banners and flags, flowers and plants will embellish the interior of the buildings. The grounds have been graded and thickly covered with finely crushed stone, locally known as "chat," which has been rolled smoothly, making walking easy.

The grounds are easy of access. The local traction system has made plans for electric railway and bus service that is expected to be ample to handle the largest crowds and the location of the Exposition makes motoring to and from the grounds rapid and easy.

An infirmary under Red Cross management, fully equipped to take care of the sick or to provide first aid to the injured, is conveniently located. The sanitary arrangements and fire and police protection will be ample and a Tulsa restauranteur will have a large dining room where food may be obtained at all hours.

Every Form of Device

Of the exhibits themselves it need only be said that they will represent every form of device that enters into the oil business and that many new inventions or improvements on old inventions will be seen for the first time at this show. The exposition is so well-known to many thousand oil men through its three great shows in the past and by the splendid advertising it has received, that the petroleum public has come to expect a great show with nothing left out, and they will not be disappointed this year. The 1927 oil show will be up to the highest standard.

Lindbergh Is Coming

One of the features that will attract many people to Tulsa on that day will be the coming of the world's most noted aviator, Charles A. Lindbergh, the Lone Eagle, whose flight from New York to Paris made a new epoch in the history of aviation. "Slim" will be in Tulsa the guest of the Petroleum Exposition on Friday, September 30, and will visit the show and be given an opportunity to see how much technical skill and equipment was required to supply him with the fuel with which he made his remarkable overseas flight.

First aid contests in which many of the most proficient teams in the Mid-Continent will take part will be held, and lovers of big "he men" will be given an opportunity to root for their favorites in a tug-of-war contest to be given September 28, on the grounds in which six-man teams of husky oil workers will enter a contest of strength and endurance. The women of the oil industry will be given an opportunity to contest for prizes in a typing and calculating machine contest.

20 Passenger Planes Coming

More than 20 airplanes will carry visitors to the exposition. In addition to Charles Lindbergh's "Spirit of St. Louis," the great passenger plane Stanolind will carry officials of the Standard Oil Co. of Indiana and the big Ryan passenger plane of The Texas Company will bring officials of The Texas Company from Houston, Tex. Eagle-Picher Lead Co. officials will come from Joplin, Mo., in a "Swallow," and the Manhattan Oil Co., Phillips Petroleum Co., Sinclair Oil & Gas Co., Mid-Continent Petroleum Corp., Skelly Oil Co. and others will be represented in flights to the exposition.

Scientific and Technical Exhibit

The Scientific and Technical Exhibit which will occupy its own building on the exposition grounds will, it is said, be the best of the series of exhibits the technical men have given at the Exposition. New features have been added. One of the new features worthy of special mention will be the large relief map showing the geological peculiarities of the greatest of oil fields, Seminole, in Oklahoma. A visit to the scientific and technical exhibit will be a liberal education in oil in all its departments.

The exposition gates will open at 9 o'clock every morning, excepting on Sunday when they will be opened at 10 a. m. There will be dancing every evening but Sunday, from 8:30 until 11:30 at the grounds. The exposition itself will close each evening at 11:30 o'clock.

PETROLEUM EXPOSITION PROGRAM

The program of the Fourth International Petroleum Exposition has been announced, and while minor changes may be made in it between now and the big show it is expected that it will stand about as given. The program follows:

Saturday, September 24

Opening day of Exposition: Producers' Day, Texas Day, Cosmopolitan Day.
Officers of the day: W. G. Skelly and Directors H. N. Cole and Jacob France.
12:00 Noon—All exhibits open and ready for inspection.
1.30 p.m.—Official opening ceremony.
2:00 p.m.—Official opening of Exposition by President Coolidge, using golden telegraph key used to open Alaskan Railroad. Pan-American Exposition and Tulsa Spavinaw Water System.
3:30 p.m.—Annual safety and first aid meet, Mid-Continent Oil and Gas Association.

Sunday, September 25

New York Day, Chicago Day, Natural Manufacturers' Association Day, Optimists' Day.
Officers of the day: Vice President Alf G. Heggem and Directors G. A. Dye, Ernest B. Nicklos and John M. Lovejoy.
1:00 p.m.—Opening of Exposition gates.
2:30– 5:30 p.m.—Sacred band concert.
8:00–11:00 p.m.—Sacred band concert.

Monday, September 26

Louisiana day, Rotary Club, Chamber of Commerce Day, Okmulgee Day.
Officers of the day: Vice President Frank Hinderliter and Directors A. C. Leonard, R. C. Sharp and J. Edgar Pew.
7:00 a.m.—Qualifying round, Petroleum Exposition golf tournament, Tulsa Country Club.
9:00 a.m.—Opening of Exposition gates.
2:30 –5:30 p.m.—Band concert.
3:00 p.m.—Old oil men's contest. Recognition of pioneers in oil industry. Presentation of Rockefeller medal to oldest oil man.

Tuesday, September 27

Amarillo Day, Borger Day, Shawnee Day, Seminole Day, Logan County Day, Natural Gas Day.
Officers of the day: Treasurer James J. McGraw and Directors R. F. Garland, H. V. Foster and Waite Phillips.
8:00 a.m.—Golf tournament match play, Tulsa Country Club.
2:00 p.m.—Ladies' contests with typewriters and calculating machines.
2:30– 5:30 p.m.—Band concert.
9:30 p.m.—Aerial night fireworks display by Lieut. J. V. C. Gregory, pilot for Eagle Picher Lead Co.

Wednesday, September 28

California Day, Oklahoma City Day, Dallas, Houston and Fort Worth Day, Western Petroleum Refiners' Association Day, Definers' Day, Civitan Day.
Officers of the day: Secretary William Holden and Directors Walter Gray, A. A. Beard and Walter Miller.
8:00 a.m.—Golf tournament match play, Tulsa Country Club.
2:00 p.m.—Demonstrations and instructions in safety and firefighting equipment.
2:30– 5:30 p.m.—Band concert.

Thursday, September 29

Wyoming Day, Arkansas Day, Transportation Day, Transportation Club Day, Bristow, Sapulpa and Cushing Day, Oilton, Drumright and Osage Day, Junior Chamber of Commerce Day.
Officers of the day: Directors Robert W. Egan, J. M. Post, Clyde Pape and Ralph B. Pringle.
8:00 a.m.—Golf tournament championship matches.
9:00 a.m.—Opening of Exposition gates. Col. Charles A. Lindbergh's official visit—subject to change.
2:30– 5:30 p.m.—Band concert.

Friday, September 30

Mid-Continent Oil & Gas Day, Co-Operative Day, Tulsa Day, Bartlesville, Enid and Nowata Day, Wichita Day, Kansas Day.
Officers of the day: Directors Ray L. Dudley, Clyde Alexander, C. P. Dimit and P. D. Hayes.
2:00 p.m.—Annual business meeting of Mid-Continent Oil and Gas Association, fifth floor, Cosden Building.
2:30– 5:30 p.m.—Band concert.
3:00 p.m.—Tug-of-war contest.
7:00 p.m.—Annual banquet Mid-Continent Oil and Gas Association, Crystal Ballroom, Mayo Hotel.

Saturday, October 1

Marketers' Day, West Virginia Day, Scouts' and Geologists' Day, Scientific and Technical Day, Ohio Day.
Officers of the day: Directors Warren C. Platt, J. S. Sidwell and J. M. Hayner.
9:00 a.m.—Opening of Exposition gates.
2:30– 5:30 p.m.—Band concert. Football game, Tulsa University vs. Parsons College of Fairfield, Iowa.
11:30 p.m.—Exposition gates close.

Responsibility Is Put Up to Field

Captain Lucey Puts Question Point Blank to Executive and Field Superintendent

By Capt. J. F. Lucey
National Chairman, American Petroleum Institute, Committee on Standardization of Rotary Drilling Equipment

"So regulate your own industry to bring out maximum production. Help lick the Germans and win the war," were the simple words of Herbert Hoover to representatives of the various industries who assembled at his request so that he might outline to them the manner in which they could co-ordinate their efforts as an industry rather than as individual units.

Democracy, Hoover continued, is on trial the question is, shall the ideas of autocracy or democracy prevail. He believed in democracy, he continued, and was confident that voluntary co-ordination and co-operation inspired by democratic ideals would eventually prevail. Hoover always wound up his appeal on behalf of national service.

Hoover has continued his campaign for American standards and efficiency. He now calls it "simplification." Quantity production and wide distribution, he insists, will maintain the American commercial flag in the markets of the world as against European cheap labor and lack of uniformity of methods.

In the World War the cry of the Government and all industries was—co-ordination, co-operation, maximum production, whether in the airplane, ships, drilling equipment, shells, guns; all meant just one thing, STANDARDIZATION. It is only by standardization that quantity production and accuracy, and efficiency can be maintained.

Point Blank Question

This brings me to the point-blank question that I desire to ask the oil industry, or particularly the field end of the industry: Do you want standardization? or do you wish to go back to the old methods where every cable tool manufacturer considered it was interfering with ingenuity and design if he could not have a square on his tools or a collar on his pin and box different in diameter from any other manufacturer; where every rotary equipment manufacturer decided that his shaft should be different in diameter, the sprocket should be of different pitch from that of his competitor, and the chain manufacturer decided, without notice to the industry, that he would change the pitch of his chain; the pipe manufacturer decided to put out a new thread without consulting even the distributor, or the man vitally interested, the consumer —all resulting in confusion, disorganization, fishing jobs, time lost in the field, thereby adding to the cost of drilling and producing?

I cannot conceive that the industry wishes to go back to these old methods, and if they do not, why are they not doing something about it?

Comprehensive Program

For the first time in the history of the oil industry, the consumer, the user of the material, has been brought into conference with the manufacturer and his engineer and the distributor. Between all of them a comprehensive program has been mapped out. Standards have been arrived at after a most exhaustive, practical and technical research. The standards are now ready carrying the powerful backing of the American Petroleum Institute, and yet, they are coldly and indifferently received in the field. Such expressions are heard: These standards have been adopted by "pencil pushers," ect.; notwithstanding the fact that these specifications have been passed upon and approved by field committees representing every district in the oil industry. They have been published and re-published; analyzed and re-analyzed; tried out practically, theoretically, in laboratories and in every other way possible. Every field man has been requested to participate and contribute his best judgment, and if the standards are not the highest that can be possibly obtained, the fault rests with the field, and the field only.

Failure Rests With Field

Suppose I try and fix the responsibility for what I consider the lack of success of standardization. The oil trade press would be first in the service it has rendered to the standardization program. It first created the propaganda which compelled the Institute directors to take action. It has consistently carried out the details technically and otherwise to give fullest publicity to the work of the various committees, realizing the importance of standardization and the value to the industry of standards; and, so as to be abreast of the times, most of the oil trade journals have employed technical men to properly interpret the work of the standardization committees.

The American Petroleum Institute, because of its influence and the fact that perhaps 75 per cent of the capital invested in the industry is represented on its board, has been the factor that brought about the possibility of standardization. It has contributed a very efficient organization for the carrying on of the work: but, in my opinion, has failed absolutely in properly supporting the now nearly completed program by field adoption. The manufacturer, while reluctant to begin, has carried the bulk of standardization work, especially as relates to drilling tools and rig irons. He has spent vast sums of money in research and design and cannot be given too much credit for the splendid manner in which he has performed his part of the standardization program. The failure, therefore, as I see it, rests entirely with the field. Either through ignorant field superintendents who do not appreciate the full value of uniformity of methods, or through indifferent executives who do not have the courage to insist upon standards being inaugurated, the field has failed in carrying out its part of the work.

CAPT. J. F. LUCEY

Many of us who have been identified with the work from the beginning are discouraged. We have sacrificed our time and money, and in the case of my own committee, we have not arrived at a single standard except by unanimous approval from the industry as a whole; and yet, we cannot receive the support of the field organizations.

Does It Merit Support?

I am now asking the executive and field superintendent in what way we have failed to meet the requirements so as to merit their support. It would appear that to any reasoning, conservative business man, a method that has made possible the automobile, made railroads prosperous, really won the war, and has made us the great industrial nation that we are, should surely receive the merit and support from the very men who will benefit most, the field man; in this instance, the consumer. The cost of drilling a well is made up of 75 per cent equipment. Surely you want that uniform. Had you had standards during the war, the millions in equipment sacrificed, scrapped and thrown in the junk pile after the war, could not have been possible, your standards would have protected you.

The purchasing agent, who in the past has been a menace to efficient equipment, has been quick to grasp the advantages of standardization and is co-operating splendidly. Could we receive that same co-operation from the field superintendent and some intelligent, constructive criticism, our program would be materially advanced.

Does the oil industry want to progress along practical scientific lines, or does it want to continue along the old methods of every individual for himself, every company its own standard, or is it going to profit by the lessons of the war, which demonstrated to us that only by co-ordination and co-operation through uniform methods could we, as a nation, succeed. Are we going to permit the rule of thumb superintendent in the field to wreck our standards, or are there sufficient executives with enough courage to insist upon his going into meetings and demonstrating to us where we are wrong, if he thinks so.

Campaign of Education

Perhaps my criticism of the field is unnecessarily severe. I have been advocating a campaign of education in the field believing that very few people really understand and appreciate what standardization means. Some of them think it is like prohibition—put over while they were at the front.

I believe that a bureau of speakers should be organized, perhaps within your own organization, and if you have no one who is familiar with the entire program of standardization, ask one of the men who has been identified with the work from the beginning.

I believe this special issue of The Oil and Gas Journal, which is a splendid contribution to standardization, will do much to remove many misunderstandings that now exist. It will at least place the ideas of standardization in the hands of thousands of field men who had not heretofore considered it.

I believe the responsibility for standardization rests squarely upon the directors of the American Petroleum Institute. I now refer them to their sweeping resolution passed at the St. Louis meeting stating that "Standardization is desirable and necessary." We now have the standards and it is up to the Institute to see that they are adopted in the field. They have the power to do so, and if they do not know how to use it, I am prepared to show them.

Economies Effected Will Offset Difficulties in Making Change

By FRANK PHILLIPS
President, Phillips Petroleum Co.

I am much impressed by the broad field which has been covered in the standardization work of the American Petroleum Institute. It seems to me that this work is one of the most worthwhile and constructive of the institute's activities, and that the universal adoption by the industry of the specifications for equipment of all kinds —so laboriously and carefully worked out—will result in most important economies.

There is perhaps a natural tendency to exaggerate the difficulties of the transition period from old to new, but the economies effected should far more than offset such losses as may be unavoidable in the change.

Has Adopted 100 Per Cent Several of the Institute's Specifications

By T. A. DINES
Chairman of the Board, The Midwest Refining Co.

I have followed with keen interest the work of the American Petroleum Institute's standardization committees and am particularly pleased to note the accomplishments.

The committees' work has been of vast importance to the industry, and the industry's appreciation will be shown more and more as time goes on and the standards recommended are universally adopted. So far as the operations of the Midwest Refining Co. itself are concerned, I am glad to advise that we have adopted 100 per cent several of the A. P. I. standards and are gradually working toward 100 per cent on the others.

Contact Filtration of Lubricants

Steady Progress Being Made in New Method of Decolorizing Oils. Typical Operation Explained

By J. M. Wadsworth
Refinery Manager, Independent Oil & Gas Co.

During recent years there have been marked advances in oil refinery technique, stimulated by close competition and the small margins for profit in the business. Most of these advances have had for their prime motive the reduction in manufacturing expense. One of the most interesting new developments in the business has been the process of contacting a specially prepared clay with lubricating oils for decolorizing as opposed to the conventional percolation method.

The Independent Oil & Gas Co., with a refinery at Okmulgee, specializes in the production of high grade cylinder and bright stocks and it is hoped that a description of the contacting method, which they have developed, will be of interest to the industry. This article will confine itself to the description of the method and apparatus used in preparing a bright stock.

It is well recognized that in the Mid-Continent district there are certain crudes which are particularly adapted to the manufacture of cylinder stock because of their low content of asphaltic material and sulphur compounds, and their approach to a true paraffin base or similarity to a Pennsylvania crude. Such a crude will produce a bright stock of any specified viscosity with high flash because this is characteristic of true paraffin hydrocarbons as opposed to naphthenic hydrocarbons; also, as these asphaltic materials and sulphur compounds must be removed in refining for a bright stock, such a crude is cheaper to refine.

Type of Crude

The crude run at the Independent refinery is produced south of Okmulgee in the Lucky, Papoose and Deaner Pools and averages 38 to 40 gravity, and about 60 color in 10 per cent solution on a one-quarter inch Lovibond cell. This crude will yield about 20 per cent of steam refined stock, testing:

Flash	530
Fire	610
Vis/210	190/200
Cold Test	50/60
Color	400-10% sol. on ¼" Lovibond Cell
Carbon Residue	2.5% max.
Sulphur	0.2% max.

Cylinder stock of this specification is given a preliminary acid treat before contacting. The stock is charged to an agitator at a temperature of about 160 degrees and the acid usually applied in two equal dumps, the sludge forming rapidly and being drawn off after each dump of acid. After the main body of sludge is settled and drawn off the stock is allowed to stand in a second agitator for at least 24 hours for settling the final particles of sludge.

It is important in acid treating this stock that the steam refined stock charged to the acid agitator be as free as possible of moisture to reduce the quantity of acid used and to prevent excessive rise of temperature in treating. There is some temperature rise with the dry stock which really assists the treat by offsetting radiation losses.

It is necessary to maintain a temperature during the settling operation so that the viscosity of the oil will be low enough to permit settling out the fine sludge. Of course, the viscosity is lowered considerably with the first settling of sludge so that the fine particles of sludge are settled out even with some reduction in temperature. The proper settling and removal of this fine pepper sludge is very important because it carries with it occluded acid, which remaining in the oil requires additional clay in contacting for neutralization.

Large Acid Loss

The acid treatment entails a very considerable loss, average results at this plant being 30 per cent of the original steam refined stock charged. It is necessary in economical operation to balance the loss in acid treating against the amount of clay used, and the loss in contacting to secure a specification bright stock. However, as a general rule it seems desirable to make the color in the agitator because the operator is dealing with an oil which carries the least amount of operating expense against it.

This treated oil has a color in the acid stage of about 30 in 10 per cent solution on a one-quarter-inch Lovibond cell, with an acidity of about 1 per cent. It is of interest also to note that the cold test is considerably higher on the treated oil, due to the removal of the tar and asphaltic bodies and concentration of paraffins. This acid oil is delivered to settling tanks at the contact plant for final settling of any sludge, the settled oil feeding the contact plant.

Clay Analysis

It will be necessary to describe the preparation of clay pulp before carrying the oil thru the contact stage. The clay used is California clay, received in bulk form in particles up to one half inch in diameter and contains an average of 18 per cent moisture. It has an approximate analysis as follows:

	Per-Cent.
Water	18.0
Silica	54.0
Alumina	18.5
Oxide of Iron	1.0
Lime	2.0
Magnesia	6.0
Alkalies	0.5

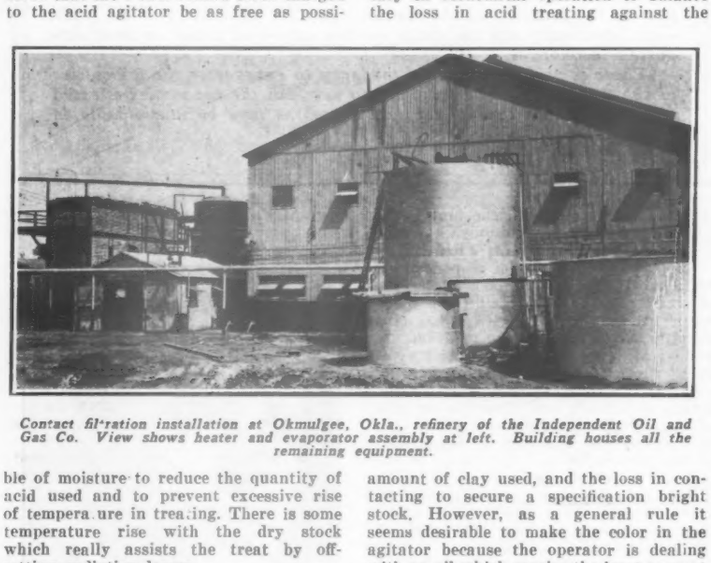
The chemical analysis, however, cannot be relied upon alone for judging decolorizing value, as physical structure and method of treatment are important factors.

The contact process is one of selective adsorption where capillary structure of the adsorption material is of great aid and it is probable that proper treatment of the clay leaves it with these microscopic capillaries open by removing the limes, magnesias, alkalies and iron.

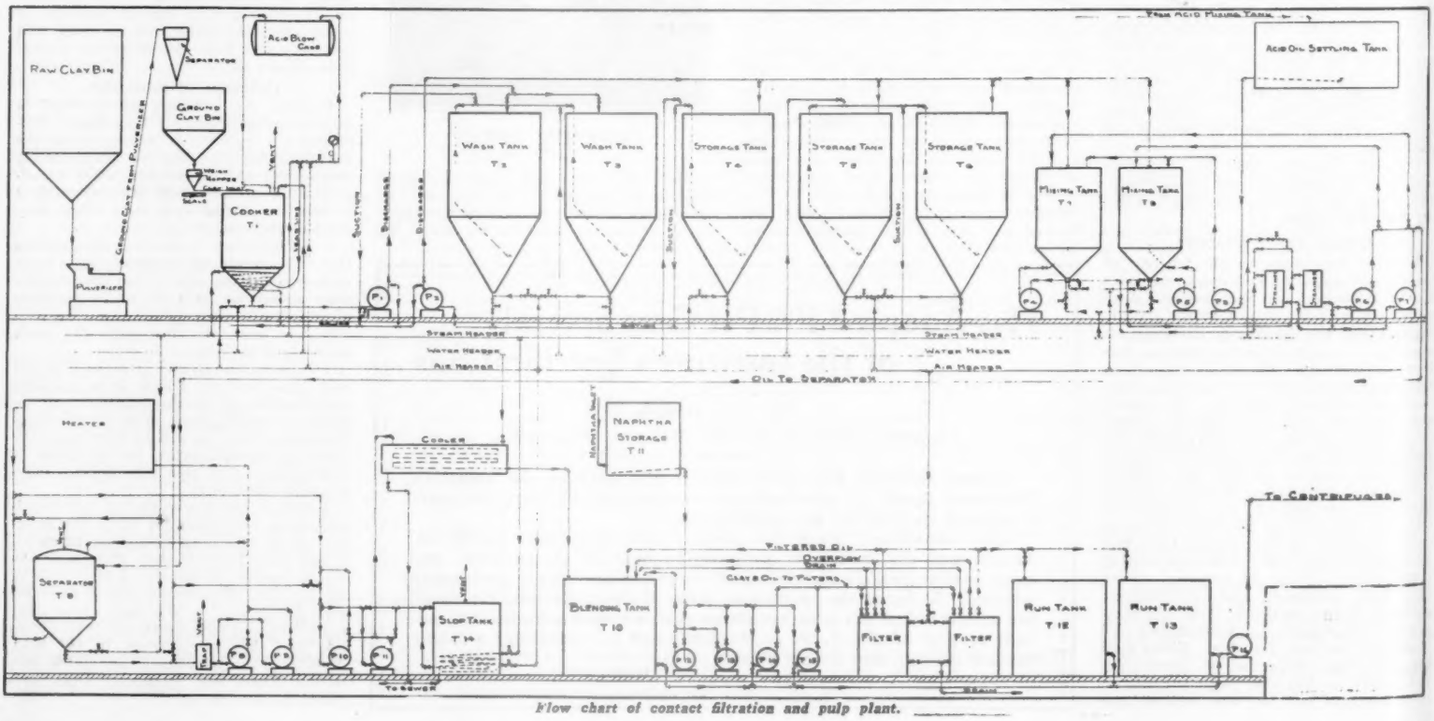
The clay feeds a Raymond Pulverizing Mill where it is ground so that 80 per cent of it passes a 200 mesh screen, with about 95 per cent to 98 per cent through a 100 mesh screen. It is important that the clay be ground to this fineness for economical results in contacting, so that the proper removal of impurities in the cooking process can be accomplished in an economical cycle time. It is, of course, equally necessary for contacting that the clay be ground to impalpable fineness.

The ground clay is elevated to a bin surmounting the cooker, where means are

(Continued on Page 102)



Contact filtration installation at Okmulgee, Okla., refinery of the Independent Oil and Gas Co. View shows heater and evaporator assembly at left. Building houses all the remaining equipment.



Flow chart of contact filtration and pulp plant.

N. P. A. Anniversary Notable Meeting

Edwin M. Lyons Elected President on Retirement of O. P. Keeney. Veterans Recall Early Days of Industry

By N. O. Fanning

New York Bureau, The Oil and Gas Journal, Room 629, No. 101 Park Avenue, New York, N. Y.

ATLANTIC CITY, N. J., Sept. 17.—The Silver Anniversary Meeting of the National Petroleum Association, held in Atlantic City, lived up to what had been predicted of it in marking a milestone in the history of the organization. In addition, as one oil man expressed it, "The spirit and actual work accomplished was a credit to the oil industry as it showed once and for all that oil men, as such, can meet and co-operate to mutual advantage."

Two factors of the meeting stand out contrasting with each other and proving that the convention was a great success from every angle. First, was the perfect atmosphere of brotherhood as exemplified by the deliberations; second, was the completeness of the program and the business-like manner in which the meetings were conducted and the work effected. One could go no farther in giving an accurate description of the convention without recording the many tributes to Judge C. D. Chamberlin, advisory counsel, and formerly secretary and general counsel, who, although scheduled to make an address, was unable to be present. Judge Chamberlin sent a letter of regret to Fayette B. Dow, general counsel, who was presiding on the day scheduled for him to speak, reflecting the warm spirit of fellowship prevalent among the members. The letter follows:

"Dear Mr. Dow: I am addressing you at the Traymore with the keenest regret that I do not feel warranted in joining you and the many good friends at the twenty-fifth anniversary of our beloved association. I am simply fearful that I could not stand the strain without some sacrifice of the fairly good state of health I have recovered in the outdoor work and exercise I have had, but be assured that I am with you in spirit of all your very interesting program, and especially the good fellowship that is and always has been the success of all its doings for the quarter century of its existence. Extend, please, my hearty greeting and congratulations on this occasion and add my warmest wishes for future success.

"Under your wise counsel it can make no errors and with the spirit of progress that has ever been a part of it, it must be even better and more potential of good to the members and to the industry than in the past. The forcible work of excellent Mr. Keeney, your able president, and his supporting board of trustees, predicates success.

"Your historical sketch of the last quarter century will serve as an index of more to be done in the future and that what is to be done will be to the honor and well-being of the grand body we have both been so proud of need not even be stated. It is a living fact and must endure and improve as time goes on.

"My heart and soul have been with the association since I first entered its service and memory will always brighten with recurrence to its splendid existence.

"Expressing to you and through you to all of the beloved associates my sincere regret at not being able to join you in person, I am as ever and always will be Most sincerely yours

C. D. CHAMBERLIN."

Truly National Gathering

The convention brought together not only many old-time oil men including some who had participated in the earlier days of the western Pennsylvania oil industry, but also an unusually large representation of leaders whose names are known both nationally and internationally in oil affairs. Also present were representatives of other oil associations including the American Petroleum Institute, Western Refiners Association, American Oil Men's Association and Independent Oil Men of America.

Orel P. Keeney, who had just completed his third year as president in opening the convention, emphasized that the association should not only look back with pride at its record of a quarter of a century, but also look forward with confidence and a determination to make the next 25 years equally successful.

The program of the convention could be equally divided between the discussion of matters of direct interest to the members and to matters bearing upon the oil industry as a whole. Substantial progress was reported in obtaining new members, welding together the present body, and in various activities touching upon the daily work of the member companies, such as fire and accident prevention, collection and assimilation among the members of statistics. One of the high spots was an address by Edward Prizer, chairman of the board of the Vacuum Oil Co., who had just completed a trip around the world during which he made a study of conditions in various countries.

The New President

Edwin M. Lyons, vice president of the Tiona Refining Co., the new president of the National Petroleum Association, is of the same young and vigorous type as his predecessor, O. P. Kenney. It is generally agreed that Mr. Keeney, who became president three years ago, inaugurated a new and more progressive era, and Mr. Lyons is counted on to carry on in that manner. Mr. Lyons has been actively associated with the association for 21 years. He entered the oil industry at the age of 21 as office manager of the Tiona company, and became vice president of that company in 1914. In 1902 and until 1912, he was also connected with the Wellsville Refining Co., and Union Petroleum Co. In addition to being president of the National Petroleum Association he is president of the National Petroleum Mutual Fire Insurance Co., and recording secretary of the Pennsylvania Grade Crude Oil Association.

It was with regret that the declination of Mr. Keeney of a fourth term as president was received after he had been unanimously chosen. Mr. Keeney in his address at the annual banquet stressed the word "future." He characteristically pounded in the idea of progressiveness. It was with real sincerity that Mr. Lyons in his first speech as president, dedicated his tenure of office to the same principle.

Mr. Keeney was unanimously elected an honorary member of the association twice, once at a regular business session and also at the annual banquet. A. C. Woodman, who proposed it at the banquet, apparently wanted to make it a sure thing, and he did.

Other officers of the association chosen at the annual meeting were P. S. Tarbox, Oil City, Pa., first vice president; H. A. Logan, Warren, Pa., second vice president; Fayette B. Dow, Washington, D. C., general counsel; C. D. Chamberlin, Cleveland, Ohio, advisory counsel; Willis Crane, Washington, D. C., traffic attorney; Herbert G. Eaton, Warren, Pa., recording secretary, and G. B. Hunter, Emlenton, Pa., treasurer.

The following trustees were elected: Fred G. Clark, Cleveland, Ohio; Sheldon Clark, Chicago; Frank B. Fretter, Cleveland, Ohio; Howard H. Greene, Bradford, Pa.; H. A. Logan, Warren, Pa; E. M. Lyons, Clarendon, Pa.; T. J. Hilliard, Pittsburgh, Pa.; O. P. Keeney, New York City; A. W. Scott, Oil City, Pa.; P. S. Tarbox, Oil City, Pa.; R. W. Wotowitch, New York City, and G. C. Davidson, Kenova, W. Va.

Looking Back

An entire afternoon, one of the most enjoyable to the members, was devoted to recalling former days of the industry, especially events leading up to the formation of the National Petroleum Association. H. L. Willock, of the Waverly Oil Works, was among those who attended the organization meeting along with his father, S. M. Willock. Among the interested listeners was A. L. Confer, who by the way, was one of several there who had seen a half a century or more of the oil business. Mr. Confer put up a small plant at Reno, Pa., in about 1870, barreled his products and loaded them on the Erie Railroad.

William Muir, formerly with the Crew-Levick Co., also added to the picture of old times. One of Mr. Muir's first operations when he entered the oil business in 1874, was the construction of a refinery at Carbondale, Pa., for the E. Hendricks Co. During the next 30 years he engaged in a great number of operations of this kind, building a plant in 1880 for Clark & Warren at Corry, Pa., in 1885 one for the Mutual Oil Co., and in 1887, he engaged in the construction of the Muir Oil Works at Warren, Pa. He became associated with the Crew-Levick Co. in 1903 and upon the death of Mr. Levick in 1913, became president. Three years later the Crew-Levick Co. was sold to the Cities Service Co. and Mr. Muir retired from active service.

Another "half-century" man who helped the newer members get a better picture of things as they used to be, was Louis Carruth, who entered the oil business in 1875, as a salesman for the Merriman & Morgan Paraffine Co., of Cleveland. In 1887, Mr. Carruth became president of the Canfield Oil Co., with which he is still associated.

R. D. Benson, former president of the Tide Water Oil Co., was an interesting speaker, outlining the growth of the oil business in which he had such an active part. He, together with W. T. Holiday, general counsel of the Standard Oil Co. of Ohio, used as a subject "The Advantages of a Common Enemy." That common enemy proved to be public misunderstanding and distrust of the oil business.

Misunderstanding of Oil Industry

Mr. Holiday said, in part: "Next to agriculture the oil industry is our most basic industry. This is the age of the internal combustion engine. The whole world revolves upon oil. But for oil, friction would burn up our whole industrial machine in a day. The oil industry is probably the greatest taxpayer in the world. Almost $1,000,000 a day in gasoline taxes alone are paid by the industry. It is idle to say that that tax is passed on. It is an excise tax, just like the income tax, and gets passed on to the public, like any other tax, 'if, when and as' possible. The industry's prices have been low in recent times almost to the point of bankruptcy. Its effectiveness in finding oil and supplying the staggering increases in demand for gasoline has been almost miraculous. There is no industry for which a stronger brief could be written in an appeal for popular appreciation.

"Yet, in the face of all that the industry has done and is doing for the public service, it has met with nothing but

(Continued on Page 104)

PRINCIPLES OF SIMPLIFICATION AND STANDARDIZATION EXPLAINED

By Edwin W. Ely,

Assistant Chief, Division of Simplified Practice, United States Department of Commerce.

Industry is constantly improving the technique of its attack on costs of production and distribution. There is an increasingly great reliance on simplification and standardization as two of management's most effective weapons. They are responsible, in part, at least, for the measurably beneficial results which have rewarded America's efforts to reduce the spread between the prices of raw materials and finished products.

Simplification may be regarded as the handmaiden of standardization. The two are not synonymous, as the former often serves as a preliminary step to the eventual development of satisfactory standards. The process of standardization, based as it is upon technical research, tests and experience, leads to the definite designation of sizes, dimensions, varieties and performance of a given commodity. The list of varieties may be short or long, but the important thing is, each variety in the list is essentially correct. The time to acquire this data depends upon the problems involved.

From a close observation of general usage it is possible to determine quickly whether the major portion of normal requirements calls for all the available varieties in such a list, or whether only a selected number are necessary. Just such observations are being made today by industry as a commercial expedient in arriving at the determination of a sound production policy that is consistent with prevailing conditions. The result of such method is a simplified list of varieties, which is susceptible of periodic resurvey and revision.

Inception of Work

In 1921 there was established in the Department of Commerce a division of simplified practice, with the special purpose of acceding to requests from industry for information concerning the accepted method of avoiding certain wastes that characterize industrial processes. In its contacts with industry the division of simplified practice has learned that it is not at all a rare thing to find 80 per cent of the business being done on 20 per cent of the variety of a given commodity. It is logical to conclude from these premises that a studied concentration upon only those varieties that are in the greatest demand would benefit not only the manufacturers but their distributors and customers as well. If producers can determine the real nature of the market they are able to develop spot stocks in anticipation of demand, the nature of which has been foreseen and measured.

Superfluous varieties can be eliminated without embarassing or in any other way hampering individuals or groups whose dependence upon replacement and special purpose parts is very real. We are chiefly concerned here with stock items, for that is where "frozen" capital is found. It is possible to release that capital for other purposes, without in any way infringing upon invention, aesthetic taste nor development of the industry concerned.

The principles of simplification are ap-

(Continued on Page 310)

Developments in Petroleum Refining

All Phases of Operation Undergoing Constant Change. Corrosion Most Serious Problem Yet to Be Solved

By T. G. Delbridge*
Supervisor, Process Division, Atlantic Refining Co.

Regardless of the line of products we manufacture, or the kind of crude petroleum we run or of how we market our output, we have one common aim, namely, to operate at a profit. True it is that all too often this aim is temporarily forgotten by the operating force in an effort to meet a promised delivery date, to produce a special desired quality of product or to correct some temporarily embarrassing predicament. As the first instance of refining improvements, I submit the growing tendency on the part of operators to subordinate other considerations to the basic purpose of profitable operation. There is still room for great advance along this line, but that which is the paramount issue in the minds of you who are owners and managers can, by judicious supervision, explanation and perseverance, be indelibly impressed upon your subordinates down to the most humble employe. These present adverse times cannot fail to lend emphasis to the prime importance of intelligent action by every man on the pay roll. The human factor can be greatly assisted and augmented by mechanical device; it can never be displaced. It is the greatest single factor in refining operations; it has been improved; it can be improved further, and the effort expended in that direction is likely to give large and quick returns.

We have a second universally common interest in that we all operate on raw material which misses no opportunity to disappear through evaporation.

Evaporation Losses

Evaporation losses from gasoline and naphthas are even more readily encountered, since it is this very property which gives these products their high place in commerce. This subject has been covered so often that mere mention would be sufficient, were it not for the fact that in this case, as often, "familiarity breeds contempt." We have always had evaporation; we have always known about it—in a way. As the second instance of improved refinery practice, I cite the various methods of reducing and even substantially preventing evaporation. The manufacturers of equipment have covered the field so well that no elaboration is required. Post-card inquiries will bring you reams of literature showing that the elusive naphtha vapor cannot get away from you if you use a floating roof, or it may be an insulated deck, or pressure storage, or breather balloons, or other device. All these have merit; which one is best for you depends upon your individual needs, and possibly on your pocketbook. Even small leaks in roof seams of naphtha tanks are important and should be caulked with a suitable plastic compound not acted on by naphtha. Apparently tight seams frequently show leaks when tested with soap solution.

Before leaving this subject, it seems wise to remind you that evaporation losses are serious, not only in storage, but particularly in the movement of crude petroleum and its more volatile products. Working tanks, pumped or flowed frequently, should not be overlooked. Out of the immense volume of data now in print on the subject, one fact is well worth remembering: 1,000 cubic feet of gasoline-saturated air at 90 degrees Fahrenheit contains 15 gallons of the most valuable part of the gasoline. At 15 cents a gallon this means $2.25 per 1,000 cubic feet. Compare this $2.25 with the price of 1,000 cubic feet of manufactured gas! Remembering that a cube 10 feet by 10 feet by 10 feet holds 1,000 cubic feet and that a 10,000-gallon tank car contains over 1,300 cubic feet, it is easy to understand how profits evaporate. Speaking of tank cars, gasoline-loading operations should be carefully reviewed by each of you. I realize that you all know how to load, but my question is, "Do you do it that way?" Some months ago a refinery somewhere in Pennsylvania was found to be loading motor gasoline with an overhead line ending in the dome. The extensions lines for loading lay unused on the rack. The loss per 10,000-gallon car loaded at 95 degrees Fahrenheit was found to be 24 gallons. By installing a permanent counterweighted loading line ending in a tee that could rest on the bottom of car, this loss was reduced to 5 gallons per car. A description of this particular device will appear shortly in one of the technical journals.

*Atlantic City convention, National Petroleum Association, September 16.

IMPROVEMENT MEASURED BY PRECEDING EXPERIENCE

Doctor Delbridge says: "What constitutes an improvement depends upon immediately preceding knowledge or experience. To the starving man, mouldy bread is a wondrous repast. He who has always driven a four-cylinder car, marvels at the smoothness of his new six. So with methods of refining petroleum, an improvement is strictly comparative as referred to past practice. You will, therefore, recognize that no person can be familiar with just what has been or is being done by all refiners, many of them actual or potential competitors.

"The present paper makes no pretensions at presenting in completeness or with guarantee a compendium of the latest models of refining apparatus or method. It is merely a recital of development which seems worth while from the viewpoint of one individual. Certain it is that much of what follows is well known to all of you; possibly all of it is old to some of you. If, in the course of the review, a few profit by direct information or by suggestion, my purpose will have been fulfilled."

At this point a digression is made for the purpose of emphasizing that what we think we know is often inadequately interpreted. The question to be propounded is a straightforward one with a definite answer, which answer most of you will not even approximate. It is this: Given a solid spherical ball of ordinary cork—the kind used to cork or rather uncork a bottle—and supposing this cork ball to have a diameter of 15 feet, how many pounds will it weigh? We are all familiar with the nature of cork and realize that it is light. Your answer, if you are an average individual, will be about 100 pounds. The correct answer is about 28,000 pounds—14 tons. The purpose of this interlude is to impress on you the danger of guessing even when you think you have a fair basis for the guess. So with evaporation losses, don't guess. Measure or calculate, or both. Make sure that you know the proper remedies and above all be sure that the application of these remedies is carried out in fact and not merely in your fancy.

Processing Operations

Passing on to processing operations, your attention is called to an approximate general manufacturing expense distribution, namely:

Fuel (stills and boilers)	40%
Process labor	20%
Maintenance	15%
Chemicals, clay, etc.	15%
Sundry	10%
	100%

Costs in different refineries will vary somewhat from these figures depending on kind of crude, nature of end products, size of plant and efficiency of operation. Except in very abnormal cases, the figures given are believed to convey a correct idea of the average present manufacturing expense. They portray in striking manner the overshadowing importance of fuel costs. Your association, during the last two years, has wisely devoted much attention to the matter and you are or should be well informed as to improved methods of utilization and, therefore, conservation of fuel. Still fuel efficiencies of 30-35 per cent are not so far in the past that they seem strange. The standard for today is 65-70 per cent, with more than a hope of reaching 75 per cent, now standard for boiler practice in the refinery. Such improvement is due mainly to the design of furnace and of heated surface, to increasing utilization of radiant heat, to heat exchangers and economizers, to the adoption of continuous processing and to constant control of combustion. The last factor is increasingly important. Fortunately, instrument makers are at our service with reliable indicating and recording meters for temperature, pressure, volume, CO_2, etc. Ignorance of furnace and still conditions is no longer an adequate excuse for poor firing.

We, in this part of the country, have not failed to take advantage of coal as fuel. Under ordinary conditions, coal, hand-fired, is ultimately more expensive than low-grade fuel oil. The use of suitable stokers properly installed and operated has in general reversed that condition. The use of pulverized coal, now firmly established in other industries is just beginning to find its place in the refinery. One of the eastern companies has recently made four installations of powdered coal on pipe stills. Preliminary results are promising, and there is abundant reason to believe that this method of heating will become popular, not only because of its easy control, but also because the change from coal to oil or gas can be made practically instantaneously.

Radiant Heat

The better use of radiant heat may well be considered a distinct advance in petroleum distillation. Not so long ago the rate of heat input through the still bottom was only 6,000 B.t.u. per square foot per hour. Today, 25,000-30,000 is a rate not uncommon in pipe-still practice. Excellent results have been obtained by more or less completely surrounding the source of radiant heat with tubes. This principle is applied in a unique and novel manner in two stills now in course of construction. The results are expected to have a profound effect on future heater design.

Another instance of improvement is in heat insulation. Heat, like gasoline vapor, misses no opportunity to migrate and disappear without contributing its share to that profit which we want and must have. Excellent heat insulating materials are now manufactured specifically for our industry. Any manufacturer of these materials will gladly tell you how much you can save by installing the right kind—his kind—of insulation. He is almost certain to be right but—insulation, like heat and like gasoline vapor, is prone to wander from its proper place, unless applied with unusual care and maintained with very unusual diligence and vigilance. If you have any doubt as to the accuracy of the words "very unusual," an inspection of insulation in your refinery is prescribed. The results from this prescription are usually beneficial, except in fatal cases due to shock at seeing the actual condition.

Insulation to retain cold is even more important than that to retain heat. It costs twice as much to make ice as it does to make the same weight of steam. Perhaps the outstanding recent development in wax distillate pressing is the realization that effective insulation is always profitable and often indispensable to satisfactory operating results.

Savings in Labor

The second largest item in refinery manufacturing expense is labor. Refining methods are dependent on both quality and quantity of labor as on no other single factor. It is not surprising, therefore, that the proper utilization of labor is receiving intensive study and with resulting improvement in refinery operation. Piece rates, the group bonus and similar systems, when soundly conceived and equitably administered, are rapidly increasing in popularity, with men as well as management. The interest and enthusiasm of process operators is being stimulated in many ways. While time will not permit further comment, this subject is urgently recommended for your careful consideration.

Distillation Features

Distillation, as the most important process in petroleum refining, has been studied and developed to a high degree of efficiency during the last three years. The three outstanding features of development are continuous coil heaters, fractionating columns and the application of vacuum.

Among the advantages of the up-to-date pipe still are the following:

Saving of rerunning; whereas in 1923 the average complete lubricating refinery actually charged into still sabout 2.7 bbls. for every barrel of crude run, with the pipe still this is cut to 1.5 bbls. or even less.

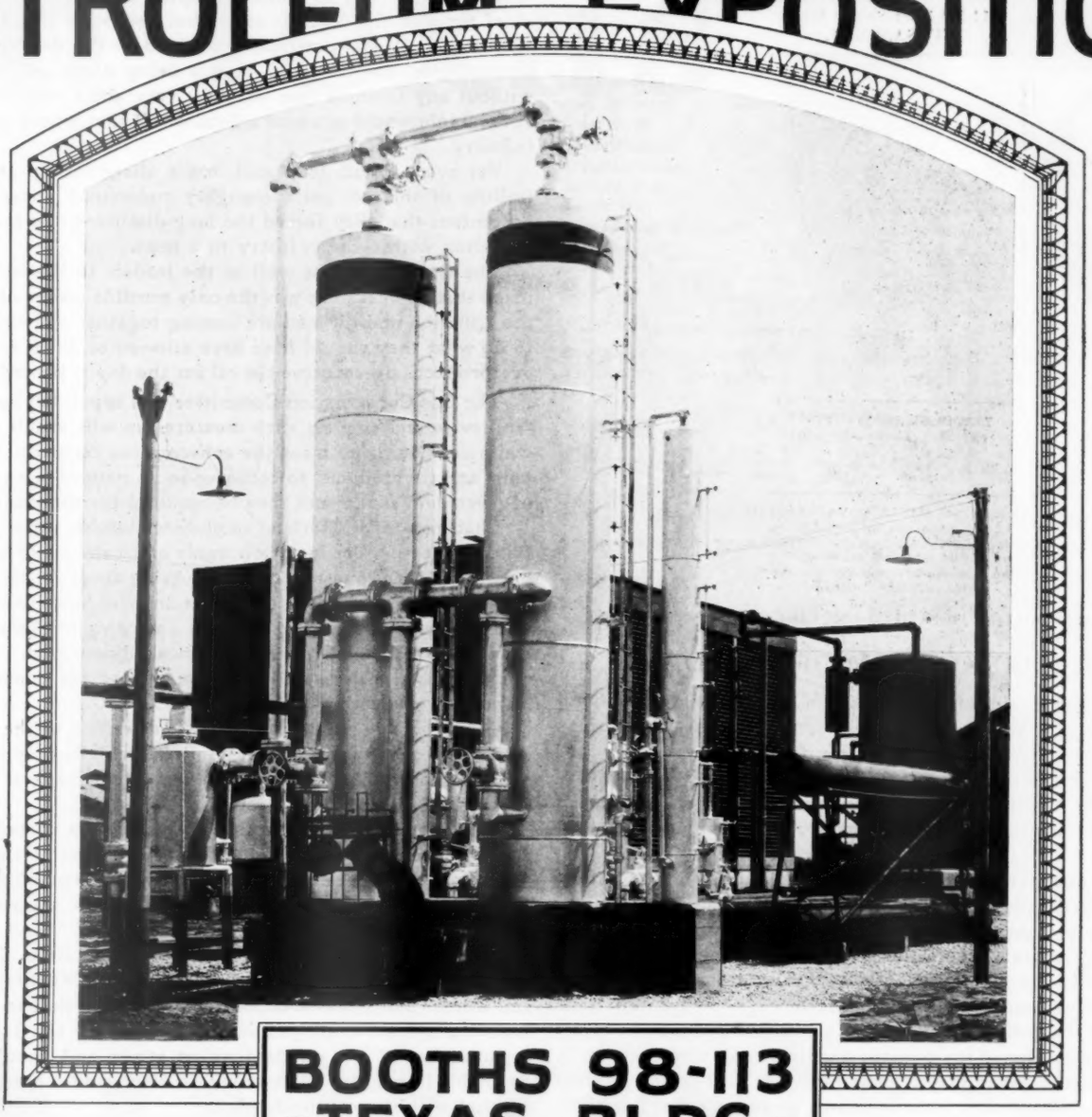
Saving in fuel; the fuel required for the crude distillation alone is about 65 per cent of that used for corresponding batch distillation in shell stills. Savings in steam are of about the same order of magnitude.

Complete recovery of the more valuable products, conspicuously gasoline. A modern bubble tower properly operated gets all the gasoline existing as such in the crude. Similarly lubricating oil yields may be increased by 50 to 100 per cent on the finished oil basis, depending on kind of crude and former method of running. It should be noted that the quality of high boiling products from the pipe-still is appreciably better on account of the short time of exposure to high temperature. This is reflected in subsequent refining operations. It is possible to go to lower bottoms than can be done in batch shell still practice. Runs of Mid-Continent type crude to 8 per cent bottoms are common.

Reductions in labor, in ground space, in fire hazard are other advantages of

(Continued on Page 102)

Fourth International
PETROLEUM EXPOSITION



BOOTHS 98-113
-TEXAS BLDG.-

Will contain a glass model of the Newton Absorber in actual operation

You are cordially invited to *see* why Newton is the "Profit Process"

NEWTON PROCESS
MANUFACTURING COMPANY
FULLERTON, CALIFORNIA

The OIL and GAS JOURNAL

PRODUCING REFINING MARKETING

Published Weekly by
THE PETROLEUM PUBLISHING COMPANY
114-116 West Second Street
TULSA, OKLA.

Established as an International Publication in 1910 by Patrick C. Boyle

President - - - - - - - - - - - - Frank T. Lauinger
Vice President and General Manager - - Robert W. Egan
Secretary-Treasurer - - - - - - - - - - W. T. Bryan
Editor - - - - - - - - - - - - - James McIntyre
News Editor - - - - - - - - - - - Andrew M. Rowley
Associate Editor - - - - - - - - - - W. T. Anderson
Refinery Editor - - - - - - - - - - - C. O. Willson
Technical Editor - - - - - - Charles K. Francis, Ph.D.
Advertising Manager - - - - - - - - Clarence Morris
Circulation Manager - - - - - - - - - J. P. Mulkern

DISTRICT ADVERTISING OFFICES

C. L. CAIN - - Room 629, 101 Park Ave., NEW YORK CITY
E. KLAPPENBACH, 1328 Peoples Gas Bldg., CHICAGO, ILL.

TERMS OF SUBSCRIPTION
(By Mail, Postage Prepaid)

Single copies	$ .15	One year (in United States)	$6.00
Three months	$2.00	One year (in Canada)	$7.00
Six months	$3.00	One year (foreign countries)	$7.00

ADVERTISING RATES ON APPLICATION
Telephones: 6291-6292-6293
Remittances by Checks, Drafts, Express or Postal Money Orders should be made payable to
The Petroleum Publishing Company
Cable address, "Oilgasnal"

MEMBER AUDIT BUREAU OF CIRCULATIONS

THE BIG PROBLEM OF THE DAY

The Colorado Springs meeting of the Gas Conservation Committee appointed by the American Petroleum Institute at its sessions in Tulsa last December marks out a definite program.

Much has been learned in the meantime from experience at Seminole about the functions of gas in the production of oil. But even those most familiar with the subject will admit that much remains to be learned.

There are questions on which even now the most contradictory opinions are held, questions that have yet to be answered convincingly one way or another.

The official report of the Colorado Springs meeting summarizes this situation in the statement that there was a completely frank and open discussion of the present knowledge or limitation of knowledge of the functions of natural gas in the production of oil —all of which developed the perhaps unanimous opinion that, while natural gas is believed to play a very important part in the production of oil, yet remarkably little is known about its exact functions and the best means of utilization.

That being the case the committee decided that it was highly important to the industry that a more thorough study be instituted and the facts developed be made available to guide the industry in its present stage of evolution.

To accomplish this study will require the active co-operation of everyone in the industry qualified to give assistance. The committee makes the point that, because of the necessarily co-operative manner in which the application of gas must be handled, no particular advantage is attained by any one company in retaining to itself knowledge about the functions of gas since this knowledge could not be applied to the best advantage unless like knowledge and opinions are held by others whose co-operation is sought.

This has been very generally recognized in practical application. The readers of The Oil and Gas Journal owe a debt to those engaged in the air and gas lift operations for the freedom with which they have permitted the publication of their methods and conclusions as they progressed in their work. The problem has been considered so big and so general that it was felt whatever knoweldge was gained should be contributed to the common information of the industry in the hope that it might lead to further enlightenment.

In the nine months that have elapsed since its appointment the Gas Conservation Committee must have acquired a very valuable fund of information based on the actual experience of the industry in that time.

Of all the revolutionary advances in the industry there was probably none that was so quickly adopted and became so quickly the chief topic of the day. It seems but yesterday that the discussion of the gas lift was practically confined to the deliberations of the technological associations. It was being discussed as a theory without any thought that within a very short time its application at Seminole would produce a flood of oil that would overwhelm the industry.

Yet every cloud, it is said, has a silver lining, and the potentialities of this not yet thoroughly understood innovation were so portentous that they forced the long-discussed and long-needed co-operation within the industry to a head.

The Government, as well as the leaders in the industry, recognized that co-operation was the only sensible means of dealing with the situation and oil men are coming together and being permitted to do what they should have been allowed to do in every period of overproduction—conserve the oil for the day it is needed.

The Gas Conservation Committee was appointed by the Institute "to devise and suggest such measures as will enable the industry, while continuing to meet the consumption requirements for petroleum and its products, to conserve in its natural state such reserves of petroleum as may not then be required for consumption."

Chairman E. W. Marland emphasizes another phase of the matter. Besides meeting consumption needs and conserving unneeded supplies there is the question of how to bring about the most economical production of oil and gas. Other industries beset with overproduction problems have solved them by enlarging markets and by more economical production meeting price adjustments. Relative production costs will be an important part of the committee's study because of its bearing on price trends.

One debatable point has been as to the effect of the use of the air or gas lift on ultimate production. But this is only one of several questions on which the experience and judgment of the industry should be collected and digested.

It is gratifying to learn that it was readily agreed by the companies represented at the Colorado Springs meeting that they would lend their technical experts and supply their technical data for the purpose of making a comprehensive study of the entire problem, laying it before the industry generally.

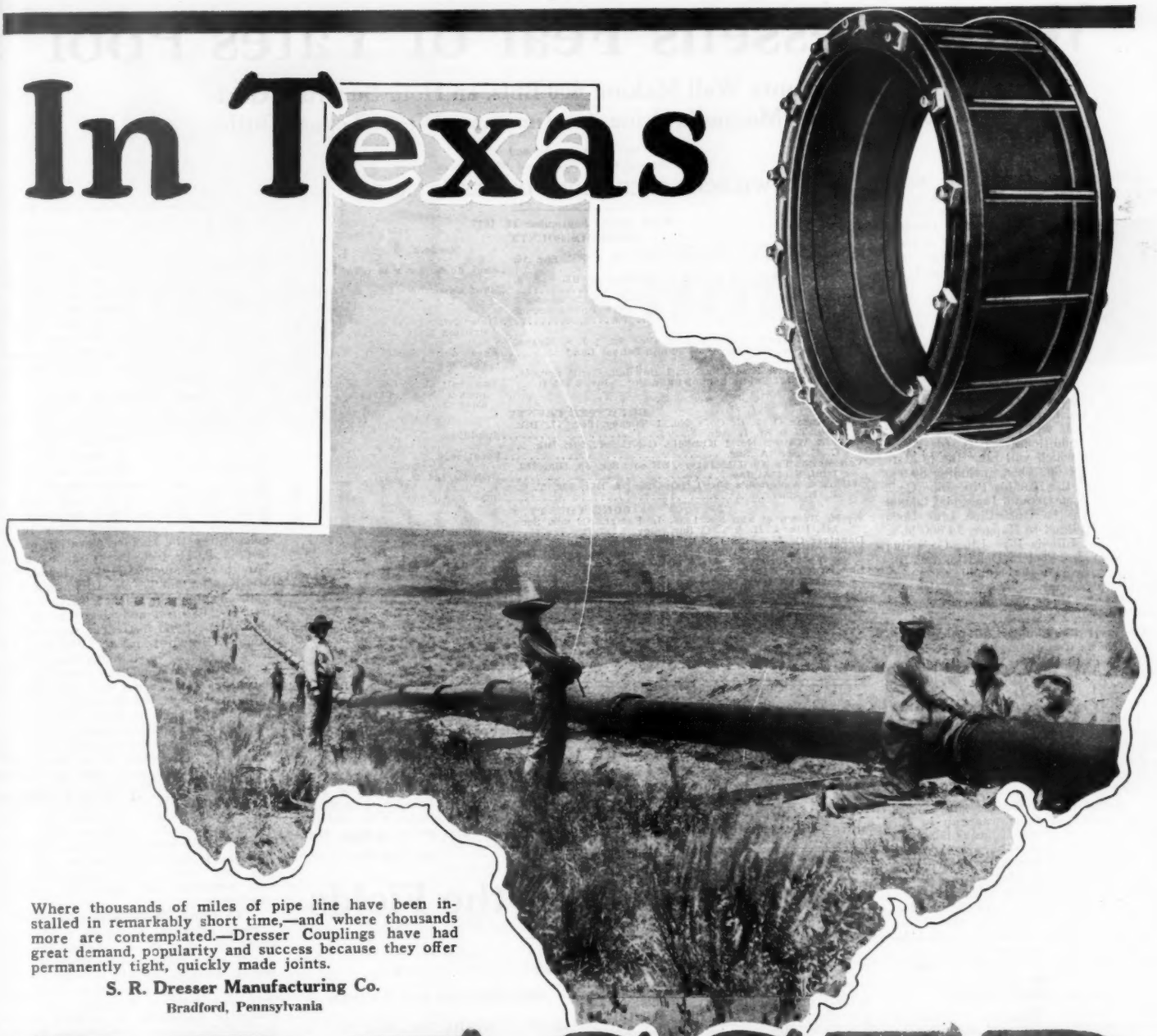
The division of the technical subcommittee into regional committees covering the Pacific Coast, Rocky Mountains, Oklahoma and Kansas and Texas and Louisiana, with the East to be added, follows the system employed so successfully by the Institute in the organization of its standardization study and should be equally profitable in results. It assures that direct and representative interest that will be most productive.

The additional enlistment of outstanding scientists and engineers, apart from the technologists directly connected with the industry itself, may be of value since several of these have been engaged in research work that may throw light on the questions to be considered.

The four to six weeks allotted to this technical subcommittee for compiling and analyzing data may seem short but a working committee applying itself intensively to correlating the mass of information already available and assembling and analyzing the data that will be presented should be able to prepare a foundation for the discussion in the general committee to follow at Ponca City.

The subject is so complex, not only in its technical phases but in the legal questions involved which have been referred to another subcommittee of lawyers, that the conservation committee may not be able to make a complete report to the Institute at Chicago in December or that the Institute may not feel able to make definite recommendations then. But in either event a constructive beginning has been made towards collecting the experience and opinions of those qualified to guide the industry and another example has been offered of practical co-operation among oil men in solving their own problems.

In Texas



Where thousands of miles of pipe line have been installed in remarkably short time,—and where thousands more are contemplated.—Dresser Couplings have had great demand, popularity and success because they offer permanently tight, quickly made joints.

S. R. Dresser Manufacturing Co.
Bradford, Pennsylvania

DRESSER COUPLINGS DOMINATE

Water Lessens Fear of Yates Pool

Crockett County Well Making 600 Bbls. an Hour Surprises Geologists. New Magnolia Line to Increase West Texas Outlet

By C. D. Lockwood
Staff Correspondent, North and West Texas

FORT WORTH, Tex., Sept. 19.—A 600-bbl.-an-hour well on the edge of the Yates Pool, across the river in Crockett County, went to water last Saturday and thereby provided the sensation of West Texas. Magnolia Pipe Line Co. also started work on the fourth trunk line serving this district, an 8-inch welded line from Midland to the company's Riddle station near De Leon, Comanche County, and expects to have it finished shortly after the first of the year. It will provide about 20,000 bbls. daily additional outlet for West Texas crude which will raise the total to more than 150,000 bbls., including 80,000 bbls. through the Humble Pipe Line Co.'s carriers to Comyn and Ingleside, 30,000 bbls. through the Gulf Pipe Line Co.'s line from Midland to Ranger, 14,000 bbls. through the Illinois Pipe Line Co.'s line from the Yates Pool to Del Rio, and 10,000 bbls. through the Humble's topping plant at McCamey. Surveys for the new line are being made now and the pipe has been ordered.

The well which upset all calculations in the Pecos County area last week was Gulf Production Co.'s No. 1 Thompson, located in the SW cor. of Section 71, Block 1, I. & G. N. Survey, Crockett County. It is just across the Pecos River from the Yates Pool, being a northeast offset to Allsman & Bell's small River Bed producer. It was reported last week as flowing 707 bbls. in 16 hours with the tools lodged in the hole 8 feet off bottom and with the big pay just touched at 980 feet. About the middle of the week another string of tools was run in the hole and the first string was dislodged, with the result that oil started coming out of the hole so fast both lines had to be cut and the well pinched in. When opened up for a couple of hours later, this well flowed by actual gauge 600 bbls. the first hour and 527 bbls. the second hour. It was then pinched in to 30 bbls. an hour, and was estimated by the company's production men to have an initial capacity of 563 bbls an hour.

Making Sulphur Water

Late Saturday, however, it started making sulphur water, and according to the latest gauge it was flowing about 900 bbls., pinched in, but 32 per cent of the output was sulphur water. The well was then shut in completely.

It is difficult to formulate a hasty opinion as to the exact meaning of this well's behavior on the future possibilities of the Yates Pool because of its relative position on the structure. When it came in for such a tremendous flow last week, some of the geologists are reported to have started tearing up ther maps of that area, figuratively speaking. Gulf Production Co. geologists were as much surprised as anybody else, having anticipated a small producer or a dry hole, but nothing comparable to what they encountered. Due to the way in which the river sections offset each other across the stream, and to the position of the Allsman & Bell producer, the Gulf well is not an east offset to the River Bed test but is situated in a northeasterly direction from it. The River Bed well is 362 feet lower on the structure than the California Co.'s No. 1 Yates, which is the highest well to date. The former has a lime elevation of 1,117 feet above sea level and the latter 1,479 feet. The exact depth to the top of the lime in the Gulf's No. 1 Thompson is unknown. In fact, company geologists are not sure that the well has yet reached the lime, as production may be coming from a sand which is encountered in nearly all wells in the field just above the brown lime. However, at most, the Gulf producer is 57 feet above Allsman & Bell's No. 1 River Bed or more than 300 feet below the highest producer on the structure.

May Reduce Field

One thing that this dose of sulphur water does apparently show is that hydrostatic pressure is responsible for the large initial production of the Yates wells. If such is the case, estimates of ultimate recovery and potential output of the field may have to be revised downward. Geologists who have studied the field point out that it may have a number of "hickeys" in the producing area, and that the water table may not be uniform. Some of the wells get the big production near the top of the lime while others have to go 100 feet or more into it.

Whether due to psychological effect or to reasoning based on previous experience, the effect of this sulphur water in the Gulf's No. 1 Thompson has been to greatly lessen the fear of the Yates Pool as another Seminole. Many feel that prolonged open flow tests of other wells in the pool might produce the same results. The fact that this well is 300 feet or more lower on the structure should be borne in mind, however.

Next Addition to Pool

The next addition to the Yates Pool will probably be Gulf Production Co.'s No. 1 Smith, located 990 feet south of the NE cor. of Section 28, Block 194, about three-quarters of a mile due west of Mid-Kansas and Transcontinental's No. 1 Smith-Taylor. First oil was found at 1,263 feet; at latest report the depth was 1,282 feet with oil slowly rising in the hole. Since the surface elevation of this test is 2,641 feet its position on the structure is about 100 feet lower than Mid-Kansas and Transcontinental's No. 1 Smith-Taylor which has a surface elevation of 2,651 feet and picked up its first showing at 1,165 feet. The reported topping of Brown Lime at 1,199 feet last week in Gulf's No. 1 Smith was in error. A little brown lime was found at that depth but after casing was cemented and drilling resumed the bit went into sand. The lime which is used for correlation by Gulg Production Co. geologists and others has not yet been topped in this well. Although it is 100 feet or so lower than the Smith-Taylor well, it is still higher than the McMan-Marland producer.

Simms Oil Co.'s No. 1 Smith, in the SW cor. of Section 103, Block 194, and about half a mile northwest of the McMan-Marland producer, is also expected in soon. It was drilling below 1,225 feet late last week. The McMan-Marland well produced 540 bbls. last Friday, pinched in.

To Gauge Wells September 28

Pecos County operators ratified the proration plan at a meeting in Fort Worth last Friday, and the work of gauging all wells in the field in order to compute the potential production of the pool will be undertaken September 28. The executive committee is to meet in the field on the evening of September 27, and all wells are to be gauged for an hour each, representatives of all producers concerned having been invited to witness the tests.

This proration plan places no drilling restrictions on the operators but accomplishes one beneficial result: If an operator desires to drill more wells than he needs to fill his alotted portion of the pipe line capacity, he can erect storage to take care of the production but forfeits his claim on the pipe line outlet. Very few, if any, however, want to store that sulphurous oil.

Another Pecos County failure has been completed. It is Red Bank Oil Co.'s No. 1 McKenzie, CNW N half, Section 21, Block 126, and was plugged at 3,512 feet. It had a hole full of sulphur water at 2,641-60 feet and again at 2,761-80 feet.

New Pecos Locations

Several new Pecos County locations were reported this week, mostly in the Yates Pool. Mid-Kansas and Transcontinental's No. 4 Yates-B is located 1,156 feet east and 250 feet north of the SW cor. Section 62, Block 1 (corrected location); same companies' No. 3 Smith-Taylor is 200 feet west and 704 feet south of the most easterly NW cor. of the companies' Yates-A lease and is located in Section 33, Block 194, G. C. & S. F. Survey. Red Bank Oil Co.'s No. 2 Smith is 660 feet

(Continued on Page 354)

WILDCAT OPERATIONS IN WEST TEXAS

Week ending September 17, 1927

Company, Farm and Location—	Remarks—
ANDREWS COUNTY	
Calvin & Belt's No. 1 Ratliff & Bedford, C NE, Sec. 16, Blk A-54	Shut down for water 350 ft.
J. S. Cosden's No. 1 Ratliff & Bedford, C SE Sec. 8, Blk. 73, Public School Land	Shut down for 10-in. at 500 ft.
Sartain Oil Co. et al's (was Deep Rock Oil Co.'s) No. 1 W. J. Harris, C SE Sec. 12, Blk. A-46, Public School land, elev. 3,167 ft.	Hole full fresh water 1,050 ft.; drilling 1,075 ft.; carrying 10-in.
B. B. McKennon's (was Neff et al's) No. 1 J. S. Means, C SE Sec. 12, Blk. A-35, Public School Land	Shut down 1,020 ft. for 10-in. casing.
A. G. Carter & Zweifel's No. 1 Cowden, C SE Sec. 18, Blk. A-52, Public School Land Sur., elev. 3,156 ft.	Top salt 1,375 ft.; encountered pocket of air 3,635 ft.; drilling 3,696 ft.
BREWSTER COUNTY	
Mid-Kansas O. & G. Co.'s No. 1 Turney, Sec. 77, Blk. 213, T. & St. L. Sur.	Spudding.
Reese & White's No. 1 Kimbale, C NE Sec. 204, Blk. 9, G. H. & S. A. Sur.	Location.
Van McPhail's No. 1 McIntyre, SE cor. Sec. 59, Blk. 353, 7 mi. S of Alpine	Drilling 960 ft.
Wilcox & Anderson's No. 1 Gage, Sec. 3, Blk. 360, T. C. R. R. Sur.	Shut down for 8-in. 1,000 ft.
COKE COUNTY	
W. H. Brown et al's No. 1 W. L. Foster, SE cor. Sec. 142, Blk. 2, H. & T. C. Sur., elev. 2,222 ft.	Drilling 1,615 ft.
Danciger O. & R. Co.'s No. 1 Mrs. Byrnes, Clinton Sur.	Drilling 1,825 ft.
Lipan Oil Co.'s No. 1 S. M. Conner, Sec. 71, Blk. 2, H. & T. C. Sur.	Shut down 1,215 ft.
Lipan Oil Co.'s No. 1 E. C. Rawlings, Sec. 390, Blk. 1-A, H. & T. C. Sur., elev. 2,750 ft.	Cementing 6-in. 2,736 ft. total depth (was abandoned last April).
CONCHO COUNTY	
The Exploration Co.'s No. 1 Hartgrove, Blk. 240, J. Schouch Sur., elev. 1,718 ft.	Junked hole 1,670 ft. (corrected depth); skidded machine 25 ft. north; rigging up.

(Continued on Page 97)

Late News from the Fields

OKLAHOMA

The Greater Seminole area produced 434,008 bbls. on Tuesday of this week, with the output of the Blackwell Oil & Gas Co.'s Nitey lease not included. There were 814 wells completed and producing on that day, and the Blackwell company decided to test out its property and opened its wells wide. It declined to give out the results.

The best well in the Earlsboro Field is the Independent Oil & Gas Co. and Margay Oil Co.'s No. 1 Gaines in Section 11-9-5, which is flowing 11,535 bbls. daily. This is to the north of the Magnolia Petroleum Co.'s Holmsley lease. In the same section, the Gypsy Oil Co.'s No. 7 B. Carter is flowing 100 bbls. an hour from Wilcox sand 4,250-72 feet. Continental Oil Co.'s No. 3 Spencer, NW cor. SE NW Section 11-9-5, is flowing 75 bbls. an hour from sand 4,250-58 feet. Gypsy Oil Co.'s No. 2 Noble, in Section 12-9-5, is making 75 bbls. hourly from sand 4,318-36 feet. No. 3 Noble is flowing 135 bbls. an hour from sand 4,246-65 feet.

In the Bowlegs Field, the Sinclair Oil & Gas Co. and Kingwood Oil Co.'s No. 4 Ellen, in Section 11-8-6, is flowing 2,300 bbls. from sand 4,030-70 feet.

In the Little River Pool of Seminole, the Philmack Oil Co.'s No. 1 Sango, NE cor. SW SE Section 2-7 6, apparently is a failure in the Wilcox sand, having 3,000 feet of water in the hole from sand 4,338 50 feet. This is south and west of the Amerada Petroleum Corp.'s Nitey lease, which has a light well upon it, and may define the southwest limits of the Little River operation.

BIG WELL IN DALE FIELD

SAN ANTONIO, Tex., Sept. 20.—The Texas Company & Humble Oil & Refining Co's No. 2 Clinginsmith, in the Dale Field in Caldwell County, was drilled in on Monday. A half hour's gauge showed a production of 105 bbls., or at the rate of over 5,000 bbls. a day. The casing was set on top of the Serpentine at 2,032 feet.

The Texas Company's No. 2 Beatty, an offset to the No. 2 Clinginsmith gauged 537 bbls. in 24 hours on Sunday.

DEEPENING POTRERO WILDCAT

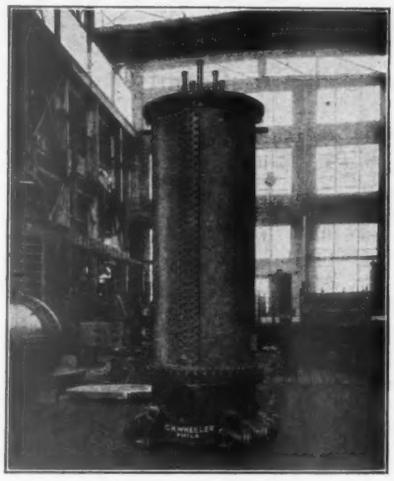
LOS ANGELES, Calif., Sept. 20.—The Associated Oil Co. is deepening its Potrero wildcat on account of its failure to flow. It had a large showing of gas but only a limited oil showing.

The wildcat well in the Casaloma district in the Bakersfield area is still being swabbed but its worth is yet undetermined.

DENVER GAS FIGHT

DENVER, Colo., Sept. 20.—Mayor Stapleton has signed the contract ordinance passed by the city council requiring the Public Service Co. of Colorado to bring natural gas to Denver from the Amarillo Field. Following that action Tyson S. Dines, attorney for the Colo-

(Continued on Page 358)



Announcing the

LEACH FRACTO CONDENSER *and* HEAT EXCHANGER

We have completed a license agreement with Mr. C. H. Leach of Boston, Massachusetts, for the manufacture and sale (under protection of the Leach patents) of the Leach Fracto Condenser and Heat Exchanger.

We are therefore in a position to offer this equipment to oil refineries and to all other process industries employing vacuum, atmospheric or pressure distillation of liquids in their manufacturing processes.

The Leach Fracto Condenser supplements our line of High Vacuum Distilling Equipment which we have manufactured and successfully installed during the last four years in the largest refineries and industrial plants in the United States.

We solicit your inquiries and shall be pleased to furnish detailed information and other data pertinent to this important development in the distillation field.

WE ALSO MANUFACTURE:

- Surface, Jet and Barometric Condensers
- Oil Vapor Condensers for high Vacuum Distillation
- Heat Exchangers, Sand Separators
- Radojet Air Pumps for vacua up to 29.95 inches
- Forced and Natural Draft Cooling Towers.

C. H. WHEELER MFG. CO.
19th Street, Lehigh and Sedgley Avenues
PHILADELPHIA, PA.

C. H. WHEELER of PHILADELPHIA

Cockrell Well Increases Production

Roxana Producer in Southern Hutchinson Flows 8,500 Bbls. When Deepened First Oil Showing in Oldham County

By James H. Dameron
Staff Correspondent, Texas Panhandle Fields

FORT WORTH, Tex., Sept. 19.—Continued increases in production of Roxana Petroleum Corp.'s No. 1 E. Cockrell in southern Hutchinson County, a small showing of oil below sea level in Oldham County, and an 80-bbl. producer in Gray County marked another quiet week in the Texas Panhandle district.

Daily estimated production of the district declined another 590 bbls. to an average of 97,475 bbls. distributed among the counties as follows:

County—	Bbls.
Carson	8,655
Gray	9,575
Hutchinson	77,775
Wheeler	1,435
Potter	35
Total	97,475

This represents a decrease of 610 bbls. in Carson County, 490 bbls. in Hutchinson County. Gray County, however, offset Hutchinson with a gain of 490 bbls., while Wheeler gained 55 bbls. and Potter 5 bbls. Among the companies, Roxana Petroleum Corp.'s output was noticeable since it increased from 4,200 bbls. to 5,960 bbls. due to the continued gains made by its phenomenal gusher in the Cockrell Pool of Hutchinson County, while Phillips Petroleum Co.'s production slumped 1,470 bbls.

The increased output of Roxana's big well was due to deepening. This well was reported a couple of weeks ago making as much as 3,800 bbls. at 2,835-36 feet. And last week it was reported deepened to 2,849 feet with an increase to 5,351 bbls. This week it was again deepened to 2,863 feet and by actual gauge flowed more than 8,500 bbls. of oil. This well is in Section 3, Block B-2, D. & S. E. Survey.

Oldham County Showing

The first showing of oil at any length in Oldham County was encountered this week by the Prairie Oil & Gas Co. in its No. 1 Landergin, Section 46, League 210, near the central part of the county. And strangely enough the showing was found 889 feet below sea level. With a surface elevation of 3,606 feet, this well topped the lime at 3,770 feet, or 164 feet below sea level. The oil showing came at 4,495-4,515 feet through 2,600 feet of water in the hole. The bottom of the hole is therefore 909 feet below sea level. At latest report they were running 6-inch pipe to shut off the water and test out the showing. This test is about 60 miles from the nearest production.

Gray County Gusher

Gray County's gusher was Gulf Production Co.'s No. 1 J. B. Bowers-A in Section 89, Block B-2, about 2 miles south of the Pampa Pool, which has been making some oil for a couple of weeks. It topped the main pay at 2,990 feet this week and at total depth of 3,003 feet flowed 537 bbls. in 7 hours, then increased to 85 bbls. an hour. It flowed 85 bbls. daily at 2,970 feet.

In the section south of this well, Delaney's No. 1 Jackson, NW cor. E half SW Section 88, Block B-2, was estimated good for 25 bbls. at 2,843-63 feet. This extends production half a mile southward.

The Donley Gray Oil Co.'s No. 1 Gordon, Section 79, Block 3, about 2½ miles north of the Pampa Pool, was drilling at 3,090 feet at latest report and didn't yet have the gas. Surface elevation is 3,233 feet so the prospects don't look too rosy.

One of the Panhandle's oldest drilling wells was abandoned this week. It is James and others' No. 1 fee in Section 9, Block 47½. This well was started in 1920 and drilled to 1,580 feet by the Dalhart Oil & Gas Co., then taken over by Mr. James and his associates who carried it down to 2,870 feet. It was abandoned at that depth because a string of 6-inch pipe was lost in the hole.

Western Hutchinson

In western Hutchinson County, Anderson & Pritchard's No. 2 Yake, SE cor. N half Section 2, Block J, H. & G. N. Survey, encountered 400 feet of sulphur water at 2,778-88 feet, with surface elevation of 2,938 feet. At 2,838 feet, however, the water appeared to be exhausted and the hole filled 300 feet with oil in 12 hours. This test seems to be running about the same as No. 1, which is a half mile east and which made 10 bbls. at 2,748 feet, although salt water was just underneath the oil.

The Badger area of Hutchinson County was extended about a mile northeast by Mountain States Oil Co.'s No. 1 Haile, Section 24, Block M-21. It was shot with 120 quarts from 2,980 to 3,040 feet and flowed 190 bbls. the first 24 hours and 150 bbls. the second day. Surface elevation is 3,070 feet.

Another Potter County test struck the granite core of the Amarillo Field. This is Amarillo Oil Co.'s No. 2 Masterson-J, Section 69, Block 018, D. & P. Survey. The granite was topped at 2,380 feet and the well was completed for 8,000,000 feet of gas at that depth. First gas was found at 2,095 feet.

There were 3 new locations this week, 15 old locations, 2 rigs building, 8 rigs already constructed, 8 tests rigging up, 106 wells drilling and 79 wells shut down. The wildcat operations numbered 76 this week.

In Hale County, Bailey & Everett have started spudding No. 1 Thomas in the center of Section 36, Block B. R. M. Thompson Survey. This is about 4 miles north and west of the Donnell Petroleum Co.'s lease. The latter concern has built rigs for two more tests near the first two, but may not drill them because of the poor showing of No. 2, shut down at 500 feet.

Lease Buying Continues

Some lease buying continues throughout the Panhandle, but it is only a shadow of former activity. One deal of considerable size was reported whereby the Tidal Oil Co. and the Kingwood Oil Co. assigned their blocks in several counties to the Exploration Co. The cash consideration was small but was accompanied by a one-sixteenth interest in a 10-well play. The Tidal Oil Co. had approximately 30,000 acres in Cottle and Motley Counties which went in on this deal.

The Exploration Co. is also reported to have made a new deal with the Matador Land & Cattle Co. to drill six tests on that concern's land. Exploration company now has a five-year commercial lease on the acreage, which cost 50 cents bonus and carries a 50-cent rental.

In Bailey County, Nelson & Beeson purchased all of League 168 for 50 cents an acre. The lease is for 10 years and has a 25-cent rental.

In Gray County, The Texas Company bought the NW of Section 14, Block B-2, H. & G. N. Survey; the north 160 acres of the L. F. Palmer land in Section 22, A. W. Wallace Survey; all of Section 2 in the S. W. Watson Survey; the SE of Section 4, Block 2, H. & G. N. Survey; and the west 160 acres of Section 2, B. S. & F. Survey, paying $10 an acre. The leases are for 10 years and have a $1 rental.

In the same county, Humble Oil & Refining Co. purchased the south half of Section 5, Block 2, H. & G. N. Survey, paying $10.50 an acre and $1 rental for 10-year leases.

In Moore County, the Delmar Oil Co. paid $6 an acre for a 10-year lease on the NW of Section 9, Block Q, H. & G. N. Survey. The rental is $1.

Empire Gas & Fuel Co.'s 40 wells in the Texas Panhandle have produced a total of 1,446,947 bbls. of crude oil, according to the statistician.

WILDCAT OPERATIONS IN PANHANDLE

Week Ending September 17, 1927

HANSFORD COUNTY

Company, Well, Farm Name, Section and Block—	Remarks—
Meadows et al's No. 1 E. D. Harrell, C Sec. 160, Blk. A-6, A. & G. Sur.	Drlg., 4,080 ft.
United Oil & Trust Co.'s No. 1 J. P. Reck, Sec. 162, Blk. 4, H. & G. N. Sur.	Spudded and temp. abd., 298 ft.

BAILEY COUNTY

Humble Oil & Refining Co.'s No. 1 W. H. Fuqua, cen. E. half Sec. 117, Blk. A, Melvin, Blum & Blum, Sur.	Drlg., 300 ft.

BRISCOE COUNTY

C. S. Rice's No. 1 J. C. Anderson, SE cor. NW NW, Sec. 22, Blk. B-3, B. S. & F. Sur.	S.D., 1,620 ft.

CARSON COUNTY

Amatex Dev. Co.'s No. 1 E. S. Polling, Sec. 22, Blk. 2-Y.	Fish., 2,110 ft.
Empire G. & F. Co.'s No. 2 Burnett Estate, Sec. 33, Blk. 5, I. & G. N. Sur.	Drlg., 2,185 ft.
Empire G. & F. Co.'s No. 3 Burnett Estate, Sec. 44, Blk. 5, I. & G. N. Sur.	Drlg., 2,315 ft.
Empire G. & F. Co.'s No. 9 Burnett Estate, Sec. 50, Blk. 5, I. & G. N. Sur.	Drlg., 2,180 ft.
Empire G. & F. Co.'s No. 10 Burnett Estate, Sec. 52, Blk. 5, I. & G. N. Sur.	Test. cas., 2,282 ft.
W. A. Gamble's No. 1-A John Dies, 36 ft N of cen., Lot 7, Blk. 11, Panhandle Townsite, Sec. 69, Blk 2, T. T. R. R. Sur.	S.D., 1,340 ft.
Marston Oil Co.'s No. 1 J. L. Noel	Fish., 3,064 ft.
Navajo Oil Co.'s No. 1 E. S. Polling, Sec. 22, Blk. 2-Y	Set 6-in. 2,496 ft; fish., 2,712 ft.
Panhandle Northern Oil Co., Sec. 62, Blk. 2, T. T. R. R. Sur.	Cellar.
Stubblefield et al's No. 1 E. Cooper, SW cor. NE Sec. 5, Blk. 2, I. & G. N. Sur.	U.R. 6-in., 2,450 ft; drlg., 2,920 ft.
Vitek Oil Co's No. 1 J. H. Elier, NE cor. NW Sec. 200, Blk. 2	S.D., 900 ft.
Willis et al's No. 1 Burnett Estate	Rotary; drlg., 50 ft.

CASTRO COUNTY

Colorado O. & R. Co.'s No. 1 M. Siemmons, SW cor. Sec. 78, Blk. M-17, B. S. & F. Sur.	Rig blown down.
Mystery Oil Co.'s No. 1 J. I. Crum, SE cor. NE Sec. 333, Blk. M-6, S. K. & K. Sur.	S.D., 510 ft. for casing.

CHILDRESS COUNTY

Brookins et al's No. 1 Mrs. Givens, 660 ft N and W of SE cor. Sec. 676, W. & M. W. Sur.	Spudded and S.D.
Continental Oil Co.'s No. 1 B. P. Smith, C NE, Sec. 14, Blk. 9	Drlg., 2,225 ft.
Hoover & Calloway's No. 1 O. L. Tucker, Sec. 736, Haggard Sur.	Spudded and S.D.
C. L. Sloane et al's No. 1 B. P. Smith, Sur. 49, F. P. Knott lands	Set 6-in. pipe at 2,902 ft; S.D., 3,000 ft.

COTTLE COUNTY

Exploration Co.'s No. 1 Richards	Spudded and S.D.

DALLAM COUNTY

James et al's No. 1 fee, Sec. 9, 47¼	S.D., 2,870 ft; temp. abd.
Wood Bros. et al's No. 1 Capitol Synd., Sec. 19, Blk. 17.	6-in. 3,375 ft; deepening 3,615 ft.
Marland Oil Co.'s No. 1 A. M. James, C SW W half, Sec. 21, S. H. McElreath Sur.	Fish. tools, 1,165 ft.
Marland Oil Co. et al's No. 1 Capitol Synd., Sec. 36 Blk. 18, Capitol Synd. land	Drlg., 2,000 ft.

DEAF SMITH COUNTY

Julien & DeGrace's No. 1 Mrs. R. A. Hindley, Sec. 47, Blk. K-3	S.D., 520 ft.
Red Hill Oil Corp.'s No. 1 Barrett, Sec. 93, Blk. K-4	S.D., 710 ft.

(Continued on Page 101)

TEXAS PANHANDLE COMPLETIONS

Carson County

Empire Gas & Fuel Co.'s No. 1 Burnett, C SW Section 55, Block 5, made 33,000,000 feet of gas at 2,260-65 feet and 2,285-2,395 feet, total depth 2,417 feet; No. 7 Burnett, C SE Section 49, Block 5, was completed for 45,000,000 feet of gas at 2,337-70 feet, total depth 2,404 feet. Mound Valley Oil Co.'s No. 1 G. W. Witter, NE cor. SW Section 1, Block 7, I. & G. N. Survey, completed some time ago as a gasser, was deepened to 3,715 feet and recompleted. It made 19,000,000 feet of gas at 2,720-3,192 feet.

Dallam County

James and associates' No. 1 fee, Section 9, Block 47½, was temporarily abandoned at 2,870 feet.

Gray County

Empire Gas & Fuel Co.'s No. 1 J. E. Cubine, NE cor. NW Section 36, Block 25, H. & G. N. Survey, was plugged back from 3,656 feet to 2,740 feet and shot with 390 quarts at 2,905-55 feet, spraying 12 bbls. afterward. This well had its first oil show at 2,715 feet and first gas at 2,229 feet. It made 9,000,000 feet of gas at 2,442 feet.

Roxana Petroleum Corp.'s No. 4 Worley, NW cor. Section 39, Block 3, swabbed 150 bbls. at 3,079-90 feet. Sun Oil Co.'s No. 5 Worley & Reynolds, SW cor. NW SW, Section 83, Block 3, flowed 10 bbls. from granite wash at 3,255-65 feet. This well had a show of gas at 3,170-75 feet and 10,000,000 feet at 3,210-20 feet 15,000,000 feet of gas; at 3,303-15 feet and 20,000,000 feet, total, at 3,320 feet.

Hutchinson County

Berryman and others' No. 1 J. M. Sanford was shut in for 70,000,000 feet of gas at 2,255-2,900 feet. It had a show of oil and some water at 3,089-92 feet and total depth was 3,102 feet. The Diamond Oil Co.'s No. 1 E. Cockrell, SE cor. N 60 acres of SE of Section 4, Block M-23, G. C. & S. F. Survey, swabbed 50 bbls. after a shot of 300 quarts at 3,003-3,137 feet.

King County

Sinclair Oil & Gas Co.'s No. 1 Burnett estate was dry and abandoned at 3,500 feet. Gibson & Johnson were also preparing to plug their No. 1 Burnett at 3,500 feet.

Potter County

Amarillo Oil Co.'s No. 2 Masterson-J, 2,635 feet from the east line and south line of Section 69, Block 018, D. & P. Survey, was completed for 8,000,000 feet of gas at 2,095-2,380 feet.

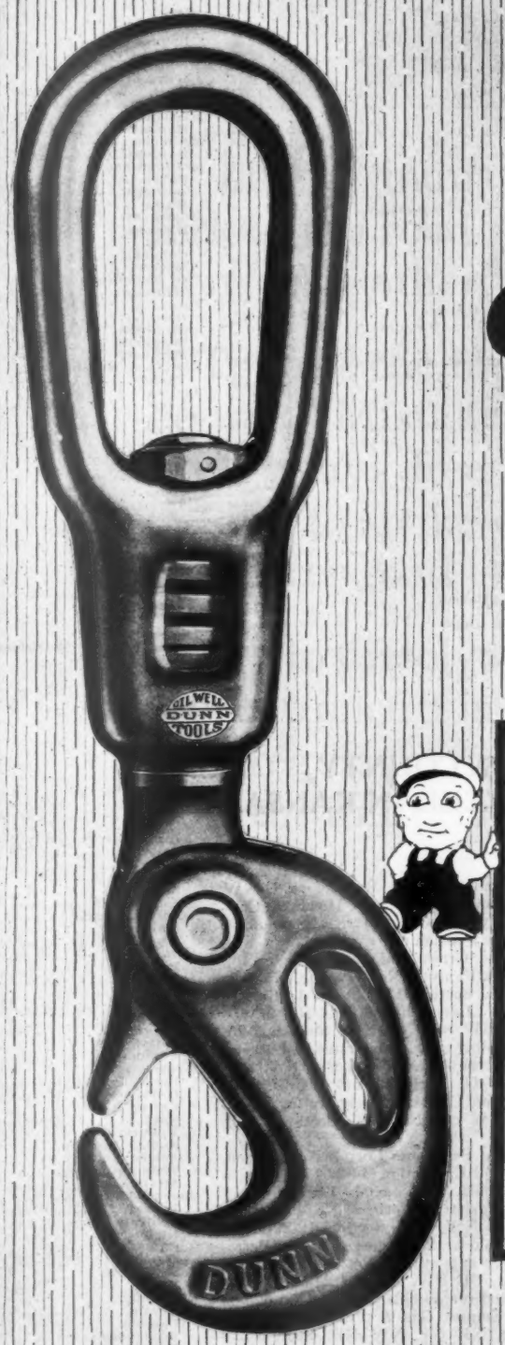
Wheeler County

E. L. Woodley, Jr.'s, No. 1 fee, Section 13, Block 5-A, had a small show of oil at 2,227 feet and a show of gas at 1,400 feet. It made 2,000,000 feet of gas at 2,382 feet, but was abandoned.

DUNN TOOLAGRAM

DUNN Safety AUTOMATIC SPRING HOOK

for Rods and Tubing



Exclusive features make for absolute safety and speed in handling. Automatically lock when in working position with the load and cannot be released except by the operator. The safety latch is fully housed, and sudden jars, dropping or the roughest usage cannot open it accidentally.

NO. 0. Light Rod Hook, Weight 20 lbs; Capacity 15 tons.
NO. 1. Regular Rod Hook, Weight 35 lbs.; Capacity 20 tons
NO. 2. Medium Combination Rod and Tubing Hook, Weight 65 lbs.; Capacity 45 tons.
NO. 3. Heavy Tubing Hook, Weight 115 lbs.; Capacity 75 tons.
NO. 4. Ex-Heavy Tubing Hook, Weight 170 lbs.; Capacity over 125 tons.

Write for circular describing construction and operation in detail.

DUNN
MANUFACTURING COMPANY
OXNARD, CALIFORNIA

Mid-Continent Branch Warehouse
215 East Archer St. Tulsa, Oklahoma

Export Sales Office
150 Broadway, New York City

OIL WELL DUNN TOOLS
TRADE MARK REG.

DUNN SAFETY *means* DONE SAFELY

Little River Awaiting New Decision

Legal Questions Being Considered Before Action Is Determined. Various Suggestions Entertained

By J. L. Dwyer
Staff Correspondent, Oklahoma Fields

After a quiet week, the Oklahoma fields' most interesting spot was the Little River Pool of the Seminole area where various legal entanglements have more or less disturbed the producers situation regarding the limitation of production.

The Little River trouble was caused by the filing of legal proceedings against one operating company by a royalty owner who was dissatisfied with the shutting in of the production upon the lease under which he had holdings. For a time this move threatened the entire Seminole situation, and at this time the ultimate decision remains unsettled. The Seminole producers have appealed to the Oklahoma Corporation Commission to raise the order of the commission which limited the output of the Little River wells to 100 bbls. per day. It is thought likely that the commission will modify its order of 100 bbls. daily.

There are numerous possibilities for this pool. The Little River Pool may be thrown wide open, and its output prorated upon the basis of 450,000 bbls. daily which was the permitted production of the Greater Seminole area, or it may be prorated and the remaining four pools permitted to flow wide open, or other means may be adopted.

It has been mentioned that the Little River production is being placed in steel storage at the expense of the operating companies, and therefore, that it really is surplus oil. The legal aspects of this situation must be threshed out before the operators will feel free to deal with it as a problem of production.

Greater Seminole Steady

The Greater Seminole Field for the past week has experienced the most steady production of its history except for the period of proration. The combined production of the five pools of the field has averaged 429,000 bbls. all week, and the only variation was furnished by the Little River Pool. Seminole City, Searight, Earlsboro and Bowlegs have held their marks very consistently, and it is believed that the peak of their output has been passed.

Dry Holes at Earlsboro

Two dry holes in the part of Earlsboro from which much was anticipated, and the fact that several drilling wells are running low has caused a revision of the idea that that pool would furnish more production. The Bowlegs Pool is pouring out a steady stream of oil with the aid of the air-gas lift. There have been several disappointing completions in the southwest part of Bowlegs which have discouraged additional drilling in this region until more promising signs are found.

There is a noticeable decrease in the drilling operations of the area and for the first time since the Seminole boom was well under way, there are numerous strings of tools piled up awaiting contracts. For a short time contractors were in great demand, and as soon as one well was finished another rig would be waiting for tools. It is estimated that at this time there are 150 strings of tools piled up in the field with no contracts.

Active Operations

Some time ago there were 575 active operations in the area and this number has been decreased to the figure shown in the accompanying table:

	Little River	Semi-nole	Sea-right	Bow-legs	Earls-boro	Ttl.
Locations	5	1	2	4	4	16
Rigs	18	6	1	22	15	62
Drilling:						
Above 2,000	14	0	2	11	24	51
Above 3,099	44	3	7	20	20	94
Above 3,700	12	2	7	14	45	80
Below 3,700	13	23	14	69	86	205
Total	106	35	33	140	194	508

The status of the producing wells in the field as of Septembed 14 showing what method is used for production, and also how many wells in the area are making water is given in the following table:

	Little River	Semi-nole	Sea-right	Bow-legs	Earls-boro	Total
Wells on air-gas	0	133	16	171	42	362
Wells flowing	8	9	25	3	72	117
Wells pumping	0	110	8	12	15	145
Wells swabbing	1	33	1	15	11	61
Wells off	0	36	0	16	34	86
Totals	9	321	50	217	174	771
Wells making water	2	98	13	38	38	189

A deep test which was plugged and abandoned during the past week was the Carter Oil Co.'s No. 1 Rogers, SW cor. NE NW Section 32-19-3w, in Logan County, Oklahoma, which was abandoned at a depth of 6,218 feet. This is the deepest well in this part of the State, if not the deepest well in the Mid-Continent Field.

The production of the Greater Seminole area by companies and leases on September 17 is given below:

Little River

Company and Farm—	Wells	Prod.
Amerada:		
Nitey	1	0
Blackwell:		
Nitey	3	3,141
Indian Terr. Illum.:		
Dungan	1	968
House, M. A.	1	1,271
House, W. E.	1	1,157
Jackson	1	1,194
Nitey	2	2,434
Reed	1	1,116
Mid-Continen.:		
Wadsworth	2	1,165
Total	13	12,446

Bowlegs

Amerada:		
Rasco	8	6,825
Atlantic:		
Baker	4	2,356
Fleet	4	1,712
Grayson	1	2,148
Jones, C.	3	185
Atlantic & Denver:		
Jones, A.	4	1,795
Barnsdall:		
McNac	1	55
Murrow	4	1,998
Carter:		
Bowlegs	3	2,660
Burden	1	0
Harjoche	6	2,210
Hilly	1	1,595
McGeisey	1	0
Walker	2	1,090
Wise	10	9,020
Empire:		
Lacy	6	1,484
Wise	2	2,227
Gypsy:		
Bowlegs	1	650
Brown	1	97
Cumsey	3	725
Grayson	1	1,532
Walker	8	4,368
Wise	2	72
Indep.-Marland:		
Coker	1	397
Ind. Terr. Illum.:		
Barnett	2	1,297
Billington	3	909
Bowlegs	8	3,249
Davis	3	1,894
Fay	2	1,555
Goforth	10	3,023
Livingston	11	10,098
Lizzie	1	506
Walker	8	3,007
Wilmont	4	2,836
Work	1	689
Youngblood	4	856
Magnolia:		
Hammond	1	125
McColloch:		
Bowlegs	3	315
Mid-Continent:		
Baker	4	4,551
Bowlegs	1	916
Hucke	1	2
Minnehoma:		
Bowlegs	4	2,000
Prairie:		
Gahagan	3	2,112
Harber	7	4,415
N. Templeton	1	2,920
Whitney	4	438
Pure:		
Reed	16	11,029
Strothers "D"	2	1,172
Strothers "E"	1	10
Strothers "F"	1	647
Roxana & Houston:		
Taylor	6	2,388
Shaffer:		
Lacy	3	890
Sinclair:		
Adam	1	6
Bowlegs	1	62
Cumsey	1	613
Ellen	3	1,620
Harjo	3	2,500
Jones	4	7,895
Taylor	4	3,890
Walker	4	2,515
The Texas Company:		
Reed	7	7,010
Tidal:		
Harjoche	3	2,375
Twin State:		
Grayson	1	0
Jones	1	2,095
Total	226	139,487

Earlsboro

Amerada:		
Anderson	4	3,435
Cowden	4	1,730
Rodgers	2	6,370
Barnsdall:		
Brown	2	3,796
Bruner, F.	1	.....
Cudjo, C.	1	28
Davis, D.	2	2,647
Davis, J.	2	223
Davis, M.	3	2,008
Gibson	6	6,293
Hearn	1	21
Hooley	1	26
Ingram	1	952
Pack	4	1,882
Peter	4	700
Sango	1	131
Sebolka	1	2,944
Sullivan, H.	2	2,332
Sullivan-Harjo	2	80
Smith	1	12
Wasutke	2	707
Carter:		
Payne	2	1,595
Sango	2	360
Continental:		
Spencer	2	5,403
Crosbie:		
Bryant	2	1,930
Empire:		
Edmundson	2	2,427
Gypsy:		
Bora	2	.....
Bruner	3	6,600
Carter	5	5,290
Earl	1	.....
McFarland	2	.....
Noble	2	2,565
Peter	4	1,742
State	4	752
Strain	1	10
Independent:		
Bruner	4	1,468
Sullivan	4	7,253
Knapp	3	1,460
Gaines	2	10,625
O'Dell	4	3,765
Inter-Ocean:		
Payne	1	.....
Magnolia:		
Bryant	4	1,219
Cowden	2	392
Edmundson	2	1,616
Holmsley	5	7,566
Ingram	1	29
Lena	3	117
Seay	4	2,192
Simpson	4	64
Sparks	6	5,164
Mid-Continent:		
McCumber	6	3,025
Mid-Kansas:		
Anderson	1	.....
Phillips:		
Dunnaway	1	30
Graham	6	1,500
Philmack:		
Dob s	2	.....
Prairie:		
Baker	1	50
Davis	3	2,700
Graham, C.	2	5,325
Graham, O.	4	7,285
Stidham	9	15,840
Roxana:		
Bayliss	1	.....
Hearn	1	56
Spencer	2	4,054
Sinclair:		
Foreman	1	.....

WILDCAT WELL IN MARION COUNTY FEATURE OF THE WEEK IN KANSAS

By J. L. Dwyer
Staff Correspondent, Kansas Fields

A wildcat well 3 miles to the northeast of production in the Lost Springs district of Marion County broke the spell of quiet which has been experienced in Kansas for several weeks. The new well is Harwood & Winters' No. 1 Ucker, SW cor. SE SW Section 2-17-4, which found the chat 2,390-96 feet, and filled up 500 feet with oil. The first 250 feet of the hole filled with oil in less than an hour, and after considering the performance of other wells in this area, the new well is estimated at 100 bbls. Coming in this far ahead of production additional interest is afforded the territory intervening; and when price conditions are improved, there will very likely be considerable drilling activity in this territory.

Close to the Oklahoma line, the Carter Oil Co. and E. B. Shawver, an independent oil producer of Wichita, have a good showing in a wildcat well near Arkansas City in Cowley County. The new well is No. 1 Baird, SE cor. SW NE Section 17-34-3, which found the Burbank sand 3,287-92 feet, and the hole filled up 500 feet with oil. This is in the Gueda Springs district.

Cowley County

Wakefield and others have the rig up for No. 1 Winfield townsite, Lot 1, Block 41, Section 22-32-4. Roth & Faurot's No. 1 Sheul, Lot 4, Block 28, Section 22-32-4, was completed for 75 bbls. in sand 2,345-59 feet. No. 1 Cavitt, Block 14, College addition, Section 22-32-4, was deepened to 2,364 feet and made 15 bbls. The Texas Company's No. 2 Hettle, SE cor. NW SE, Section 21-31-4, was completed for 140 bbls. in sand 2,387-2,417 feet. Pyle & Sutter's No. 1 Hutton, SW cor. NW, Section 15-35-4, is dry at 1,870 feet.

Elk County

Ohio Fuel Oil Co. has the machine on the ground for No. 1 Mullendore, C NW NW, Section 20-29-10. Hood & Co.'s No. 1 Eyman, CEL SE SE, Section 9-31-10, is a machine.

Greenwood County

Roth & Faurot's No. 3 Welch, NE cor. NW NE, Section 13-25-8, is drilling at 240 feet. Lassen and others' No. 2 Wilkerson, SW cor. NE NW, Section 7-25-9, is building a rig. McGinnis and others' No. 2 Ferguson, NW cor. SW SW, Section 4-27-11, is rigging up. The Prairie Oil & Gas Co. made location for No. 2 Boles, NW cor. NE NW, Section 15-22-12.

Roxana Petroleum Corp.'s No. 2 Hood, SW cor. SE, Section 14-22-11, came in for 50 bbls. from sand 1,852-96 feet. Davis, Hazlett and others' No. 1 Perkins, SW cor. NW NW, Section 12-22-12, is a dry hole at 2,275 feet. Darby Petroleum Co. and others' No. 2 Fankhouser, NE cor. SE SW, Section 24-22-12, was completed for 50 bbls. from sand 1,625-88 feet. Empire Gas & Fuel Co.'s No. 2 Demler, NE cor. NW NE, Section 25-22-12, made 600 bbls. from sand 1,666-1,734 feet. Bisagno and others' No. 1 Lane, SE cor. NE, Section 9-25-13, is dry at 1,620 feet.

Logan County

Coon and others' No. 1 Andrews, NW cor. NE NW, Section 14-14-33w, is drilling deeper at 4,310 feet.

Lyon County

Transcontinental Oil Co.'s No. 10 Atyeo "A", SW cor. NW NW, Section 31-21-10, is dry at 2,304 feet.

Marion County

The Prairie Oil & Gas Co. made location for No. 1 Hartke, SW cor. SE NW, Section 1-18-4.

Reno County

Marland Oil Co.'s No. 1 Griffeth, SE

(Continued on Page 344)

The oil industry today stands at the fork of the road One leads to self-regulation The other to Government control

To take the first road is by far the safer course Mistakes may be made, but we are always free to retrace our steps, to detour, to strike out into new paths But the latter road is unpaved and uncharted

Try to dissolve a Government Board or Bureau once it is started! Eternal *external* regulation will be our fare unless we take the initiative and do the job ourselves

Universal Oil Products Company
Owners of the Dubbs Process
310 South Michigan Ave
Chicago, Illinois

Hollins	3	3,435
Skelly:		
Spencer	2	5,850
Anderson	1	215
Texas:		
Brown	3	75
Rodgers	1	6,815
Wilmont	4	247
Tidal:		
Watkins	4	1,530
Twin State:		
Barker	1	2,115
Hearn	1	2,278
Totals	189	171,317

Seminole

Carter:		
B. Carter	2	200
J. Carter	3	73
F. Carter	3	200
Creamer	2	55
R. Cudjo	4	705
W. Cudjo	2	5
Gilliland	2	325
Grisso, M.	1	470
Grisso, W.	6	1,160
Knapp	3	1,170
Killing, M	12	11,505
Killing, G.	4	1,365
Lukes	7	1,400
Ponder	2	80
Simpson	3	265
Strother	3	870
Vierson	4	475
Amerada:		
Fixico	4	1,222
Killing	4	513
Rentie	3	1,014
Atlantic:		
Cudjo, N.	3	621
Barnsdall:		
Carter	9	3,540
Henry	2	739
Jones	4	1,200
Empire:		
Gross	2	805
Wilson	2	358
Gypsy:		
Butler	3	625
Carter	8	1,270
Cudjo	5	630
Fixico	7	295
Hario	3	932
Wolf	6	125
Independent:		
P. Fixico	3	285
Hario	2	605
Independent and Garland:		
T. Fixico	8	770
Independent and Inter-Ocean:		
Jones	4	592
Indian Territory:		
Allen	1	.....
Bowlegs	11	3,540
Fleet	1	.....
Gooden	4	413
Hario	4	793
James	4	1,018
Reed	3	16
Kingwood:		
Johnson	3	1,390
Magnolia:		
Cheparney	1	140
Franks	4	1,070
Mid-Continent:		
Rentie	9	1,595
Taveche	7	420
Mid-Kansas:		
Jacksey	1	.....
Pressley	1	.....
Wilkins	1	471
Phillips:		
Strothers	3	170
Philmack:		
Butler	3	2,485
Prairie:		
Gross	5	85
Mason	1	400
Spencer	1	15
Strother	8	915
Pure:		
Strother, A.	17	3,440
Strother, B.	..	2,671
Strother, C.	1	.....
Roxana:		
Harber	2	282
Lashley	2	76
Sinclair:		
Carter	2	35
Cudjo, A.	6	1,200
Cudjo, B.	4	1,260
Dicey	2	940
Fixico	4	680
Slick:		
Cudjo	3	649
Franks	7	1,515
Giblet, Ida	3	3,736
Giblet, Sam	1	96
Superior:		
Cudjo	4	963
Texas:		
Mayhue	1	280
Strothers	..	15
Tidal:		
Carter	5	900
Fixico	8	521
Harjo, D.	1	521
Harjo, T.	6	270
Mahardy	3	49
Tayeche	2	45
Turman:		
Cudjo	4	797
Grisso	1	191
Jones	4	1,173
Totals	320	73,708

Searight

Carter:		
Davis	5	4,570
Frazier	5	4,945
Kiker	1	35
Mandler	1	105
Scott	1	40
Amerada:		
Johnson	1	130
Strother	1	15
Gypsy:		
Cudjo	3	940
Mid-Continent:		
Grayson	6	1,100
Soloche	2	1,300
Prairie:		
Cannon	1	15
Carter	1	5
Houck	1	7
Kincaid	8	950
Wiemer	1	15
Pure:		
Aldridge	5	6,643
Roxana:		
Strothers	2	2,255
Sinclair:		
Polly	4	2,060
Twin State:		
Varnum	1	880
Wilcox:		
Chupco	6	4,968
Totals	55	30,958
Totals, Bowlegs	226	139,487
Totals, Little River	13	12,446
Totals, Farisboro	189	171,317
Totals, Seminole	320	73,708
Totals, Searight	55	30,958
Grand totals	803	427,916

Caddo County

Moran and others' No. 1 McKenna, SW cor., SE NE, Section 5-5-9w, was completed for 30 bbls. at 2,382 feet.

Creek County

The Texas Company made location for No. 2 Taylor, NW cor., Section 29-19-8. Madden & Madden have the rig up for No. 1 Barnett, SW cor., NW SE, Section 31-18-10. McCulloch Oil Co. has a machine on the ground for No. 1 Barnett, NW cor., NE NE, Section 22-18-11. Henry oil Co. and others have a rig on the ground for No. 2 Unallotted, SE cor. SW SE Section 1-17-10. Henry & Avers and others have a machine on the ground for No. 1 Harris, SW cor. SE SE, Section 12-17-10. Ted Ray Oil Co. has a rig on the ground for No. 1 Litlehead, NE cor. SW NE, Section 13-17-10. The Texas Company has moved the rig out for No. 2 Fulsom, NE cor. SE NE, Section 23-17-10. Curtis Oil Co. has the rig up for No. 1-A Harris, NE cor. NW, Section 27-17-11. Pioneer Petroleum Co. has a rig on the ground for No. 1 Behen, SE cor. NE NW, Section 2-16-11 Twin State Oil Co. has the rig on the ground for No. 2 Anthis, NW cor. SW NE, Section 2-16-11. Bu-Vi-Bar Petroleum Co. has the rig at the location for No. 1 West, SE cor. SW, Section 3-15-8. Roxana Petroleum Corp. made location for No. 2 Byrd, NW cor., Section 15-15-8. H. F. Wilcox Oil & Gas Co. has built the rig for No. 3 Dixon, NE cor. NW SE, Section 18-14-10. The Producers & Refiners Corp. made location for No. 4 Harjo, SW cor. SE SE, Section 18-14-10.

Reichard and others' No. 1 Grayson, NW cor. SE, Section 14-19-7, is dry and abandoned at 3,362 feet. Magnolia Petroleum Corp.'s No. 30 Coker, NE cor. SW NW NW, Section 16-18-7, was completed for 15 bbls. in sand at 2,507-48 feet. Alvord & West's No. 1 Sier, NW cor. NE SW, Section 30-18-9, is dry at 2,704 feet in the Bartlesville sand topped at 2,614 feet. Dixie Drilling Co.'s No. 2 Goat, CSL SW NE, Section 31-18-11, is a dry hole at 1,927 feet. J. R. Cole's No. 3 Strip, NW cor. SE SE, Section 13-17-10, is a 25-bbl. well in the Dutcher sand 2,405-41 feet. McCulloch Oil Co.'s No. 4 Joconton, SE cor. NW SE, Section 13-17-10, is dry and abandoned at 2,507 feet in the Dutcher sand. No. 5 Joconton, NW cor. SW SE, Section 13-17-10, is also dry in the Wilcox sand 2,905-15 feet. Ted Ray Oil Co.'s No. 7 Brink, CWL SE SW, Section 13-17-10, has been completed for 20 bbls. in the Dutcher sand 2,433-94 feet.

Kay County

Harold Petroleum Co.'s No. 6 Case, C W half SE SW, Section 4-27-1w, Blackwell district, is drilling at 200 feet. Miller Brothers and others' No. 1 Bradley, SE cor. SW, Section 28-27-6w, has been abandoned at 4,515 feet.

Grady County

Carter Oil Co. has built the rig for No. 2 Finch, NW cor. SW, Section 22-3-5w, Carter-Knox Pool. The rig is up for No. 2 Nash, NE cor., Section 7-3-5w. The rig has also been built for No. 2 Hawkins, SW cor., Section 5-3-5w.

Magnolia Petroleum Corp.'s No. 3 Mitchell, NE cor. NW NW, Section 34-3-5w, is dry at 2,660 feet. Garvin Drilling Co.'s No. 2 Pursley, NW cor. SW SW, Section 16-4-6w, is making 21,000,000 feet of gas from sand 1,863-70 feet. Stogner and others' No. 3 Duke, SE cor. SW, Section 35-5-8w, was shut in for 42,000,000 feet of gas at 2,391 feet.

McIntosh County

Tiger Mountain Oil Co.'s No. 1 Malvern, CEL SE SE, Section 17-11-14, is shut in for 3,000,000 feet of gas in sand 1,486-1,500 feet. No. 1 P. Malvery, CWL SW SW, Section 16-11-14, was completed for 2,000,000 feet of gas in sand 925-1,033 feet.

Muskogee County

W. S. White and others have the rig up for No. 2 J. Drew, C SW SW, Section 28-15-16. D. C. Lampton's No. 1 E. Love, CWL NW NE, Section 16-15-18, is drilling at 225 feet. Sunray Oil Co. has a machine at the location for No. 8 J. Crittenden, NW cor. SW, Section 5-14-19.

H. E. Williams' No. 1 Ponds, NE cor. NW SE, Section 20-15-17, has been abandoned at 1,686 feet. Sunray Oil Co.'s No. 6 J. Crittenden, SE cor. NW NW SW, Section 5-14-19, is a 50-bbl. well in sand 704-21 feet.

Lincoln County

Shaffer Oil & Refining Co.'s No. 1-A Skinner, SE cor. SW SE, Section 31-17-5, is a rig on the ground. The rig is also on the ground for No. 2 Skinner, SW cor. SE, Section 31-17-5.

Okmulgee County

Kirkland & Son's No. 6 A. Bell, NE cor. SW SE NW, Section 17-15-13, is rigging up. J. E. Wallace has the machine out for No. 3 Colbert, CWL NW SE, Section 14-14-14. G. Colvin and others have the rig on the ground for No. 1 Phillips, NW cor. SW SE, Section 19-13-11. Kessler & Logan's machine is at the location for No. 4 Milliken, SW cor. NW NW, Section 9-12-12.

G. D. Roberts' No. 3 Belisle, CWL SE SE, Section 16-15-11, is dry at 2,121 feet. Kirkland & Son's No. 1-R Brooks, NE cor. SE NE SW, Section 17-15-13, was completed for 25 bbls. in sand 1,384-1,415 feet. T. A. Johnson Co. and others' No. 1 Vierson, SW cor. NW NE, Section 34-14-12, was completed for 9,000,000 feet of gas in the Dutcher sand 2,108-14 feet. J. E. Wallace's No. 2 Colbert, C NE NW, Section 14-14-14, is dry and abandoned at 1,809 feet. J. L. Powell's No. 5 S. Sells, NW cor. SW NW, Section 9-14-15, is a dry hole at 2,224 feet.

Osage County

Sand Springs Home's No. 107, SW cor. NW, Section 1-20-10, is drilling at 300 feet. Pueblo Petroleum Co. made location for No. 3 NE cor. SW NW SE, Section 14-21-8. Plains Petroleum Co.'s No. 1, NE cor. SW SE, Section 34-24-10, is drilling at 400 feet. A. G. Oliphant and others' No. 3, NE cor., Section 20-27-6, is a rig. Indian Territory Illuminating Oil Co.'s No. 377, NE cor., Section 17-27-11, is drilling at 730 feet.

Sand Springs Home's No. 104, NW cor. SW, Section 28-20-10, is dry and abandoned at 2,956 feet. No. 106, C NE SW, Section 29-20-11, has been abandoned at 2,024 feet. Indian Territory Illuminating Oil Co.'s No. 300, SE cor. NE, Section 2-25-11, is a dry hole at 2,030 feet. Skelly Oil Co.'s No. 8, NE cor. NW SW, Section 27-27-6, is dry and abandoned at 3,021 feet. Indian Territory Illuminating Oil Co.'s No. 94, NE cor. SW SE SW, Section 35-27-10, is a dry hole at 2,121 feet in the Wilcox.

Payne County

T. J. Hughes made location for No. 1 Strip, SW cor. NW, Section 10-18-5.

Pawnee County

Privett Drilling Co. has the rig up for No. 2 Garner, SW cor. NE SE, Section 3-20-6. F. R. Billingslea and 101 Ranch Oil Co. have the rig up for No. 2 School Land, NW cor. NE SE, Section 16-21-6. Ora Steen's No. 1 Townlot, NE cor. SE NW, Section 9-20-7, is a 2,000,000-foot gas well in sand 2,584-89 feet.

Pontotoc County

Conservative Oil & Gas Co. is building the rig for No. 1 Cox, SE cor. SW, Section 21-5-6. The rig is also under construction for No. 1 Brown, NW cor. NE, Section 28-5-6. The rig is being built for No. 1 Norris, NE cor. NW, Section 28-5-6. Homaokla Oil Co. is erecting a ro-

(Continued on Page 338)

WELL MAKING 97 BBLS. AN HOUR IN SABINE PARISH DISTRICT

By Neil Williams

SHREVEPORT, La., Sept. 19.—A 97-bbl. an hour initial producer in the Pleasant Hill district of northern Sabine Parish, Louisiana, and a favorable showing in a test in eastern Union County, Arkansas, featured wildcat developments the past week.

The former, Moffett and associates' No. 2 Moore, Section 5-9-12, blew in flowing from a broken formation at 3,234-54 feet as the biggest well completed in the Pleasant Hill area. The other test, Ohio Oil Co.'s No. 2 Crain, Section 1-17-14, 6 miles northeast of the East El Dorado Field, tested sand at 3,015-20 feet with a sand tester showing a production of 75 bbls. of clean oil. This is one-half mile southwest of the No. 1 Crain, at present pumping 45 bbls. of oil and the only producer in the district.

The No. 2 Crain is expected to figure prominently in the coming week's developments when a string of casing is run and efforts made to obtain a good producer. If the well turns out a 75-bbl. or better producer, it will throw a better light on that district as a prospective oil field and stimulate further drilling there. In the meantime, another test in the same section, Magnolia Petroleum Co.'s No. 1 Carroll, is nearing the producing horizon, coring red shale at 2,980 feet.

Catahoula Parish

In Catahoula Parish, Louisiana, Lochnager Oil & Gas Co. has made a location and is building derrick for a second test, No. 2 Beasely, Section 26-9-6e. This is 750 feet east of the company's No. 1 Beasely, which blew out several weeks ago producing at the estimated rate of 50,000,000 feet of gas daily from sand at 3,093 feet. It blew for a half hour, headed over and filled with salt water. A later test showed only salt water with a showing of gas but the results were such as warrant operators to drill another test immediately.

Leasing still is going on in Catahoula Parish as well as in Franklin Parish adjoining, where another test recently staged a blowout. In the latter parish, particularly, several interesting blocks are being worked up with contracts being made to drill 1,500-foot holes.

In the extreme northeast, where considerable interest also has been attached to wildcatting, Palmer Corp. has encountered 3 feet of formation at 2,677-80 feet believed by operators to be the Monroe gas rock. This test is the No. 1 Pioneer, Section 16-20-10e, West Carroll Parish. Six-inch casing is being set.

In western Bossier Parish, Louisiana, Triangle Drilling Co. has worked up a 3,000-acre wildcat block and already has a derrick up in Section 3-20-14 for No. 1 Sentell & Dixon. This will be a 2,500-foot test. In the eastern edge of the parish is a wildcat with favorable gas possibilities. This is Woodley & Collins' No. 1 Lincoln, Section 21-16-10. Drilling was started the past week. It is on the south Elm Grove structure.

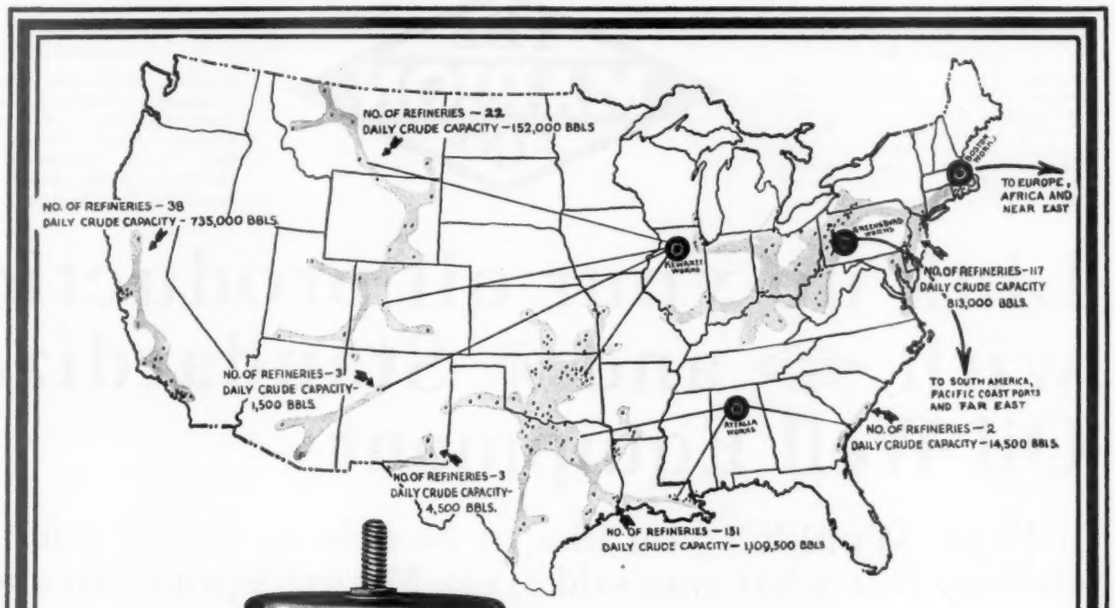
NORTH LOUISIANA

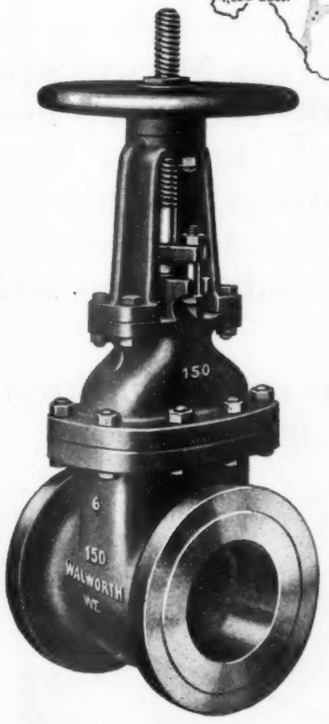
Bossier Parish

Northern Bossier Parish is experiencing an intensive drilling campaign for gas. Bahan & Davis have a derrick up for another test in the Carterville district, the No. 1 Dodson, Section 15-23-12. These operators' No. 2 Mays, Section 22, is down 3,088 feet where 6-inch casing has been cemented. Bethany Oil & Gas Co. is drilling at 1,780 feet in No. 2 Dodson, Section 16. Magnolia Petroleum Co.'s No. 1 Dodson, Section 16, is in chalk rock at 2,528 feet. Simms Oil Co.'s No. 1 Dodson, Section 15, is drilling at 2,906 feet. Atlantic Oil Producing Co.-Woodley & Collins' No. 1 M. A. Farrington, Section 22, has been completed as a 35,000,000-foot gasser in sand at 3,083-87 feet. These operators' test on the J. S. Farrington farm, Section 23, tested salt water at 3,087 feet and now is coring at 3,102 feet.

In Section 3-20-14, Triangle Drilling

(Continued on Page 329)


NO. OF REFINERIES – 22
DAILY CRUDE CAPACITY – 152,000 BBLS
NO. OF REFINERIES – 38
DAILY CRUDE CAPACITY – 735,000 BBLS
NO. OF REFINERIES – 3
DAILY CRUDE CAPACITY – 1,500 BBLS
NO. OF REFINERIES – 3
DAILY CRUDE CAPACITY – 4,500 BBLS
NO. OF REFINERIES – 151
DAILY CRUDE CAPACITY – 1,109,500 BBLS
NO. OF REFINERIES – 117
DAILY CRUDE CAPACITY 813,000 BBLS.
NO. OF REFINERIES – 2
DAILY CRUDE CAPACITY – 14,500 BBLS.
TO EUROPE, AFRICA AND NEAR EAST
TO SOUTH AMERICA, PACIFIC COAST PORTS AND FAR EAST
KEWANEE WORKS
GREENSBURG WORKS
ATTALLA WORKS



Walworth—a complete line of standardized quality and readily available from four great plants

The Walworth line of valves, fittings and tools is complete for all the requirements of piping installations involved in the drilling, refining and transportation of oil.

It is manufactured and tested to square up with a single standard of quality . . . the assurance of your satisfaction.

And it is made available by four great plants to Walworth distributors in every part of the oil country.

Our new Oil Catalog will give you all the details of Walworth materials and Walworth service.

New Oil Catalog

The sizes and specifications of all the Walworth valves, fittings and tools for the oil industry are compactly listed in this new book. Have you sent for your copy?

WALWORTH

Walworth Company, General Sales Offices: 51 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa.; and Attalla, Ala.

. . . *Distributors in Principal Cities of the World* . . .

Walworth Limited, 10 Cathcart St., Montreal, P. Q.
Walworth International Co., New York, Foreign Representative

Factory Branches are located in

Dallas, Texas; Luling, Texas; Borger, Texas; Odessa, Texas; McCamey, Texas; Burkburnett, Texas; Breckenridge, Texas; Ranger, Texas; Mirando City, Texas; Houston, Texas; Eldorado, Ark.; Big Springs, Texas; Brownwood, Texas; Tulsa, Oklahoma;

THE MARION LINE

Factory Branches are located in

Bristow, Oklahoma; Drumright, Oklahoma; Okemah, Oklahoma; Tonkawa, Okla.; Wilson, Okla.; Ardmore, Okla.; Eureka, Kansas; Salt Creek, Wyoming; Kevin Montana; Long Beach, Calif.; Bradford, Pa.; Scottdale, Pa.

Link up your oil production with THE MARION LINE and API Standardized Oil Well Equipment

It Pays. Wouldn't you like to be able to say of your machinery just what was said of the Marion equipment shown on the opposite page, "3,300 feet deep and never been a nut tightened!" Marion Steel Derricks have extra heavy base and cap semi-steel castings, double-strength starting legs, leg joints rigidly lock in clamp sockets, extra wide, heavy re-leg clamp, double header beams and heavy I-beam crown blocks.

Marion Rig Irons are manufactured to A. P. I. specifications

The following bulletins give full information concerning the Marion Line of Oil Well Machinery and will be gladly sent on request; No. 198 Bullwheels; No. 200 Pulling Machines; No. 202 Peerless Reversible Clutch; No. 203 Gas Engines; No. 205 Powers; No. 214 Hi-Test Sucker Rods; No. 217 Marionhill Pitmans; No. 219 Standard Rig Irons; No. 228 Marion Metal Buildings; No. 231 Steel Derricks; No. 232 Miscellaneous Oil Well Equipment; No. 234 No. 80 "Little Giant" Power.

American Petroleum Institute

Certificate of Authority To Use Official Monogram

THE AMERICAN PETROLEUM INSTITUTE hereby grants to

as specified in official publication of the

the right to use the following monogram

American Petroleum Institute entitled

adopted by the Board of Directors, on

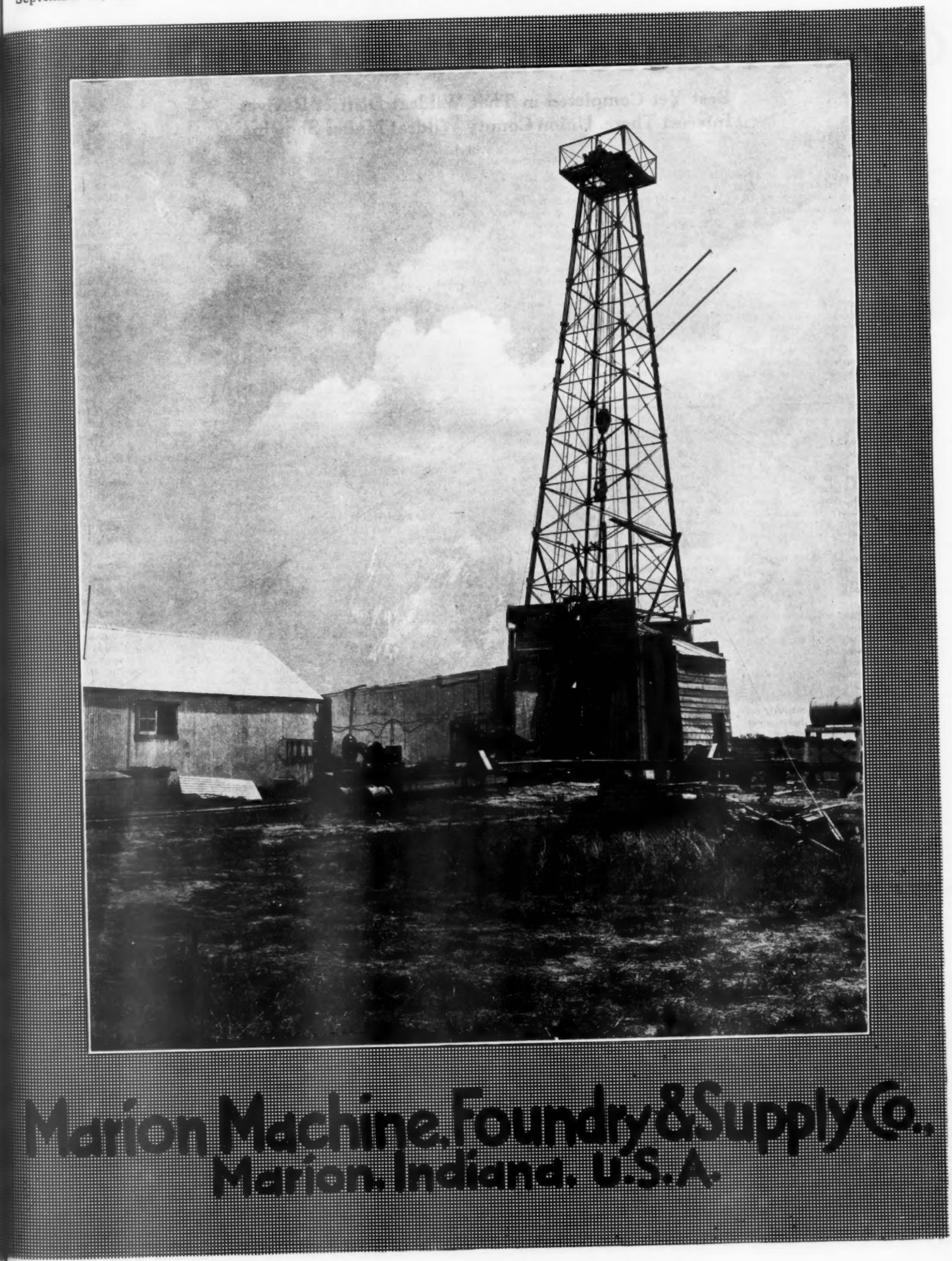
with the understanding that the use of this monogram is a representation that the material so marked complies with the said specifications, and provided further, that no materials which fail to comply with the said specifications shall be so marked.

The American Petroleum Institute reserves the right to revoke this license to use the above monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

Issued at New York, October 13, 1926.

AMERICAN PETROLEUM INSTITUTE,

Assistant General Secretary.


Marion Machine, Foundry & Supply Co.
Marion, Indiana, U.S.A.

Good Producer in Pleasant Hill Area

Best Yet Completed in That Wildcat District Revives Interest There. Union County Wildcat Makes Showing

By Nell Williams
Staff Correspondent, Louisiana-Arkansas

SHREVEPORT, La., Sept. 20.—While two wildcat districts featured field developments in the Arkansas-North Louisiana district, one with a gusher-type producer and the other with a type which looks good for a producer, the Smackover Field of Arkansas suffered a setback in the form of price reductions Saturday by several purchasers, which may be followed by others early this week. Crude in the Urania Field of North Louisiana also was reduced 10 cents a barrel earlier in the week.

The direct effect of price reductions on the Smackover Field cannot be told yet, and the situation now is pending action by the Standard Oil Co. of Louisiana and other major buyers. The reduction Saturday was by the Louisiana Oil Refining Corp., which posted prices of 90 cents for crude under 24 degrees gravity and $1.15 for crude above 24 gravity. This was a cut of 10 cents, and came as a result of a condition which arose the past week with independents eliminating premium paying and declining to renew expiring contracts.

The weakening in the Smackover market is coming as a complete surprise to operators here. This field has weathered several price reductions in other fields; and with production falling off steadily and rapidly, the oil has enjoyed a healthy demand, forcing virtually all independents to pay premiums to keep connections. Until this week, premiums of 10 and 15 cents a barrel have been common, and one company has been paying 25 cents, it is reported.

Due to the fact that production in the Smackover Field is almost entirely settled and on a small pumper basis, operators feel keenly any price reductions, with markets already at low ebb. Wells have hardly been able to break even under existing prices; and if the cut becomes general with all buyers, the field may suffer a tight shutdown. Scarcely any new operations have started in the field for several months, and completions have been only scattering.

The true cause of the market break in Smackover in the face of declining production has not been ascertained, but is blamed by many on the generally weak refinery situation incurred by heavy flush production of crude in other fields. Several independent refiners in the Arkansas district are known to be curtailing Smackover runs. One company is reported as stopping all runs of its Smackover production to its plants and attempting to sell the oil.

Louisiana Oil Refinery Corp., the major purchaser, reduced Urania, La., crude 10 cents a barrel to 90 cents, effective September 15. The cut immediately was followed by the Natural Gas & Fuel Corp. This field has a production of better than 10,000 bbls. daily, but the crude is not used generally for refining except for lubricating oils.

Pleasant Hill Producer

Field developments in the division were featured by a good producer in the Pleasant Hill wildcat district of northern Sabine Parish, Louisiana. This well, Moffett and associates' No. 2 Moore, Section 5 9-12, is the best yet completed there, blowing in flowing 97 bbls. of clean, high-gravity oil an hour from 20 feet of broken formations at a total depth of 3,254 feet. It has been flowing since with just enough gas to flow it, although, as in previous wells in the district, production has reflected a steady decline. In the 24 hours ending Saturday morning, it made 975 bbls., or around 40 bbls. an hour.

This well revived interest in the Pleasant Hill district, which has been marked the past two months by numerous failures or extremely small wells. The field has been received in unfavorable light by many operators, due to the fact that producers, if not small to begin with, drop sharply. In addition to the new well, there are 21 other producers in the district, but altogether they have been making only around 650 bbls. daily.

The Moffett well is approximately 1½ miles southwest of the center of production of the district and on a lease on which the same operators completed a well several months ago flowing at the rate of 80 bbls. a day. Several months ago the Pleasant Hill district was one of the most active drilling areas in the entire division, but for several weeks there has been very little doing there with few new operations being started to replace those completed or abandoned. The new well, however, may result in a renewal of this drilling activity.

Very little gas has been found in the Pleasant Hill Field, but the past week the Magnolia Petroleum Co. and the Arkansas Natural Gas Co. jointly took over Foster and associates' No. 1 Nabors, Section 30-10-12, which blew out during the week at a depth of 3,275 feet making an estimated 3,000,000 feet of gas. These companies will test gas showings encountered below 3,500 feet in Arkansas Fuel Oil Co.'s No. 10 Logan, Section 32. The latter test was drilled to a total depth of 3,980 feet for a deep test of the field, but at present is shut down with the bottom of the hole cemented. The Foster well is drilling deeper after killing the gas, and is coring at 3,365 feet.

Union County Wildcat Show

A southern Arkansas wildcat district also had a comeback in favor when Ohio Oil Co.'s No. 2 Crain, Section 1-17-14, eastern Union County, made a test Saturday with a sand-testing device, showing 75 bbls. of clean oil in a sand at 3,015-20 feet. This well is between a quarter and a half mile southwest of this company's No. 1 Crain, which was completed at approximately the same depth the latter part of June, pumping 50 bbls. of clean oil of around 30 gravity. That well still is pumping at the rate of 45 bbls., and so far very little water and bs. have shown up.

Interest in that district, which is about 6 miles northeast of the East El Dorado Field and about 7 miles north of the Lawson-Urbana area, slackened when two successive tests drilled after the completion of the No. 1 Crain failed to find a showing or even the same sand, and were abandoned as dry. The two tests, however, were northwest and northeast, respectively.

A string of casing will be run in the Ohio's No. 2 Crain at once, and efforts will be made to complete the test as a flowing producer. While there was very little inducement to drill for a 50-bbl. pumping well at the level in which production was found by the Ohio's well, leasing, especially by El Dorado operators, was very active following the completion of the Ohio's No. 1 Crain. Ohio Oil Co. and Pure Oil Co. are the biggest holders in that district. Magnolia Petroleum Co. has the only other drilling test in this immediate vicinity, and that test, No. 1 Carroll, also Section 1-17-14, is near the producing sand, coring red shale at 2,980 feet.

Two Irma Pool Wells

The Irma Pool of Nevada County, Arkansas, added two more good wells during the week with the completions of Autrey Oil Co.'s No. A-3 Martin, Section 6-14-20, and J. J. O'Brien's No. B-4 Moss, Section 1-14-21, with a combined production of 275 bbls. daily. Natural Gas & Fuel Corp. completed No. M-11 Urania, Section 20-10-2e, Urania Field, La Salle Parish, Louisiana, flowing 40 bbls. daily from sand at 1,540-50 feet. Other completions included two gas wells in the Monroe district and one in Caddo Parish.

Pine Island

Developments in Pine Island deep Trinity wells show little change over a week ago with deepening and retesting of wells, which have shown salt water or a little gas the past two weeks, failing to improve production. The only new addition to the field over a week ago is Gulf Refining Co.'s No. 15 Tyson, Section 14-21-15, which Saturday was flowing 243 bbls. of oil with an estimated 3,000 bbls. of salt water daily. There now are 15 Trinity wells producing in the 24 hours ending Saturday morning 4,715 bbls. of oil.

Carterville Gas Field

In the Carterville gas field of northern Bossier Parish, Atlantic Oil Producing Co. and Woodley & Collins have completed their No. 1 (J. S.) Farrington, Section 23-23-12, flowing by heads 300 bbls. of salt water and 10 bbls. of oil from a total depth of 3,106 feet. Tubing is being set with a packer in an attempt to improve the production.

Production Decline

Production in the Arkansas-North Louisiana division reflected another decrease in the daily average during the week, the drop being 1,280 bbls. The biggest decline was in Caddo light oil, which now totals 13,670 bbls. daily. Daily average production by fields was:

North Louisiana

Caddo light	13,670
Caddo heavy	5,000
Homer	4,720
Haynesville	7,050
De Soto-Red River	4,000
Elm Grove	640
Bellevue	1,050
Cotton Valley	5,360
Urania	10,150
Pleasant Hill	1,565
Total	53,275

Arkansas

El Dorado	5,940
Libson	3,005
Smackover light	10,120
Smackover heavy	78,475
Stephens	1,200
Nevada	2,685
Bradley	125
Total	101,510
Total both states	154,785
Total last week	156,165
Decrease	1,380

A summary of operations included 21 completions or abandoned tests, 14 wells waiting on pumps, 11 temporarily abandoned, 182 drilling, 17 rigs, 31 derricks and 19 locations.

NORTH LOUISIANA

Bossier Parish

Humble Oil & Refining Co.'s co-operative deep test in the Bellevue Field, No. 30 Bliss & Wetherbee, Section 15-19-11, cored hard shale and sand at 4,037 feet. Palmer Corp.'s No. 4 Bossier, Section 9-16-11, deep test in the Elm Grove Field, tested salt water at 5,370 feet after being bailed at that level. The information there is to be shot. J. S. McCullough's No. 3 Hodges, Section 25-16-12, Elm Grove, is drilling around 1,000 feet.

Caddo Parish

In the Pine Island district, Arkansas Fuel Oil Co.'s No. 1 Huckaby, Section 14-21-15, tested salt water with a show of oil at 3,676 feet but will be deepened. This company's No. 2 Bashara, Section 23, is drilling at 3,209 feet. Arkansas Natural Gas Co.'s No. 2 Lane, Section 13, is coring lime at 3,640 feet after shutting off the salt water encountered below 3,630 feet. Dixie Oil Co. has cemented 8-inch casing at 2,488 feet in No. 9 Caddo M. L. Co., Section 23. This company's No. 89 Dillon, Section 14, is drilling at 3,445 feet. No. 90 Dillon is down 2,441 feet. No. B-6 Mabry, same section, is drilling at 3,180 feet. In Section 13, Dixie's No. A-2 Noel is in shale and gumbo at 3,883 feet. This company's No. 10 Slattery, Section 27, is drilling at 4,052 feet. Golden Rod Oil Co.'s No. A-1 Hampton, Section 15, is drilling below 3,600 feet. Gulf Refining Co.'s No. 10 Herndon, Section 15, is shut down waiting orders after testing salt water with only a show of oil and gas at 3,699 feet. This company's No. 15 Tyson, Section 14, is to be blown with gas. It has 1,500 feet of salt water and 75 feet of oil standing in the hole from a total depth of 3,798 feet. Haynes Brothers' No. 2 Murray, Section 14, which tested salt water with a show of gas at 3,669 feet, has been plugged back 5 feet and will be retested. These operators are drilling at 985 feet in their second Spell test, Section 15. Magnolia Petroleum Co. has a derrick up for another deep test, No. A-8 Hampton, Section 15. This company's No. 26 Raines, Section 22, is drilling at 2,579 feet. No. 21 Robertshaw, Section 23, is reaming to the bottom at 3,607 feet. Ohio Oil Co.'s No. 25 Smith, Section 12, is drilling lime at 4,730 feet. Pittsburgh Oil & Development Co.'s No. 1 Herndon, Section 15, is to be plugged back to 3,734 feet after testing salt water with only a show of oil and gas at 3,815 feet. This company's No. 1 Huckaby, Section 15, is shut down waiting orders. It is at a depth of 3,740 feet where it is good for 15,000,000 feet of gas but heavy in salt water. The Texas Company's No. 49 Caddo M. L. Co., Section 23, is drilling lime at 3,464 feet. No. 50 is drilling lime at 2,820 feet, while No. 51 is in lime at 2,463 feet. This company's No. 6 Herndon, Section 14, is being bailed for a test of the formation at a total depth of 3,710 feet. A derrick is up for No. 7 Herndon. No. 8 (J. F.) Herndon, also this section, has been completed making an estimated 10,000,000 feet of gas, 1,500 bbls. of salt water and 1,000 bbls. of oil from a depth of 3,650 feet. This is the test which blew in several weeks ago. No. 9 Herndon is drilling lime at 2,917 feet. The Texas Company's No. 9 Herold, also Section 14, is coring at 3,561 feet. No. 10 Herold is drilling lime at 3,695 feet. No. 10 Mabry, Section 15, is drilling lime at 3,637 feet. The Texas Company is rigging up for another deep test, the No. B-14 Noel, Section 14. No. 19 Raines, Section 15, is coring at 3,703 feet.

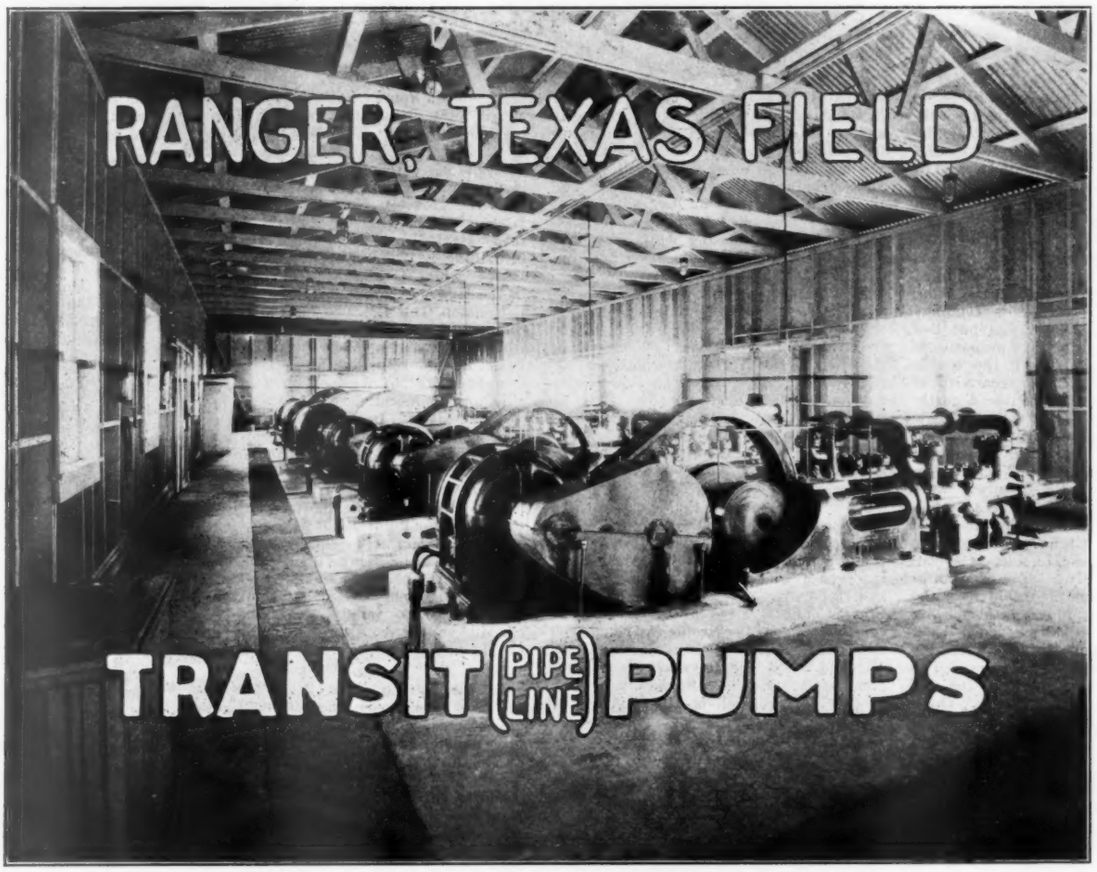
Greenwood and Waskom

In the Greenwood and Waskom districts, Belchic & Laskey have abandoned No. 2 (R. T.) Sharp, Section 22-18-16, after coring a salt water sand at 940 feet, but in Section 10 a derrick has been built for their No. 2 (P) Sharp. Greenwood Producing Co.'s No. 1 McCutcheon, Section 15-17-16, is down 338 feet. This company's No. 1 Scott, Section 5-16-16, is drilling below 600 feet. Magnolia Petroleum Co.'s No. 1 Bell, Section 4-17-16, is drilling lime at 3,044 feet. This company's No. 1 Furrh, Section 28-18-16, is drilling gumbo at 1,150 feet. Owl Oil Co. has completed No. 3 Bryson, Section 7-17-16, making an estimated 1,500,000 feet of gas from sand at 985 feet.

Standard Oil Co. has abandoned as dry its deep test in the Waskom district, the No. 2 Trosper, Section 34-18-16. This test was drilled to a total depth of 3,374 feet without hitting the gas pay found in other wells there.

In the extreme southeastern corner of the parish, Woodley Petroleum Co.'s No. B-3 Knight, Section 11-15-12, is drill-

(Continued on Page 337)



Six strong, dependable pipe line pumps in a row, running smoothly and quietly.

Where there is considerable variation in the amount of oil to be pumped, a flexible installation of many units, like the above, is the last word in station efficiency.

If you have to do with the operation of a pipe line, may we suggest that you investigate these TRANSIT Texas Type pipe line pumps. We will take pleasure in giving you the details.

Address the Home Office, or any District Office of the company.

Representatives
FRICK-REID SUPPLY COMPANY
Tulsa, Okla., or any store.
ASSOCIATED SUPPLY COMPANY
Los Angeles, San Francisco, Bakersfield, Fellows
E. L. WILSON HARDWARE CO.
Beaumont, Texas.

NATIONAL TRANSIT
Pump & Machine Co.
Oil City Pa.

DISTRICT OFFICES
NEW YORK PHILADELPHIA PITTSBURGH
CLEVELAND HOUSTON TULSA DENVER

Representatives
THE GLOBE SUPPLY & MACHINERY CO.
New Orleans, La.
F. C. RICHMOND MACHINERY CO.
Salt Lake City, Utah.
MORTON McL. DUKEHART & CO.
Baltimore, Md.
REEVES & SKINNER MACHINERY CO.
St. Louis, Mo.

New Dale Field Well Revives Hope

No. 2 Beatty of The Texas Company Made 250 Bbls. First Hour With the Valve Partly Closed. Offset Blows Out

By B. D. Stevenson
Staff Correspondent, Southwest Texas Fields

SAN ANTONIO, Tex., Sept. 19.—The Texas Company's No. 2 Beatty, a southeast offset to the discovery well of the Dale Field, came in late last week, topping the Serpentine at 2,008 feet, 113 feet higher than the discovery well, and the first hour with the valve partly closed made about 250 bbls. The valve was still further closed and it made 375 bbls. the next 11 hours in storage. With the field looking sick and discouraged due to the first three producers being small and several other wells complete failures, the No. 2 Beatty has put live and new energy into the proposition. The No. 2 blew out before the casing was set and the No. 2 Clingensmith of the Texas Company and Humble, a northeast offset to No. 2 Beatty, also blew out after topping the Serpentine at 2,056 feet. It is being completed as this is being written. The No. 1 Clingensmith, a northeast offset to the discovery well, is bailing and looks like about a 30-bbl. well. It got the Serpentine at 2,175 feet. The No. 3 Clingensmith of The Texas Company and Humble, a southeast offset to the No. 2 Clingensmith, topped the Serpentine at 1,966 feet, the highest in the field, and it is also being completed and looks like a good well. With the completion of these wells the field will have seven producers. The Texas Company's No. 1 Beatty, the discovery well and its No. 2 Beatty. Three wells on the Clingensmith lease owned jointly by The Texas Company and Humble, and adjoining the Beatty lease on the northeast, and William F. Morgan's No. 1 Osteen, 2,200 feet east of the discovery well, and the Sun-Empire's No. 2 Talley, 3,000 feet southeast of the discovery well.

Greater porosity of the Serpentine accounts for the better production in the wells completed last week. The Texas Company's No. 2 Beatty looks about as good as any of the wells that were brought in in the Lytton Springs Field and there is a possibility that the field may yet develop into a paying proposition, though it can not be a very big field unless the dry holes mean nothing. Humble is drilling two wells to the northeast and offseting The Texas Company and Humble's Nos. 1 and 2 Clingensmith which will further test the territory in that direction. The No. 1 should be down to pay before the end of this week. The Texas Company's No. 1-B Beatty, a few locations southwest of the discovery well and two locations northeast of the Sun's No. 1 Beatty, a dry hole, topped the Serpentine at 2,068 feet which was high but at 2,142 feet the well was dry. Sun's No. 1 Beatty got no Serpentine at all. First wells drilled after the discovery well had been brought in were so discouraging that no new tests have been started other than the 18 or 20 that immediately went into the field after the discovery well was in. Now with the completion of some better production the expectation is some new locations will be made and the probability is that these will be made to the north.

Mexico Producer

Of especial interest the past week was the testing of the No. 201 Pozo Ferronales, drilled by the administration of petroleum of Mexico in northern Tamaulipas. Guy M. Lewis of the Lewis Well Testing Co., of Laredo, took his invention across the river and tested the well. The drill stem tester is a device placed on the bottom of the drill stem and run into the hole with the fluid in the hole. The drill stem is floated into the hole with the tester closed. It is set with a packer and the tester is then opened. The well in Mexico from a sand at 3,595-3,600 feet came in a big gasser spraying oil and the gas subsided until the well was making only oil. The oil filled the drill stem and slopped over into the ditch. Enough oil was on the slush pit that it could be dipped up with a bucket. The oil is 44.9 gravity at 92 degrees Fahrenheit and corrected as to temperature 41.7 degrees gravity. Casing will be set and the well completed and location is being made for another well.

The location of the well is about 18 miles from the Rio Grande and a mile or two south of the San Juan River. It is about 5 miles north of Ochoa in Mexico and about 20 miles northeast of Aldamas. Many American companies have in the past held extensive leases in that part of Mexico. Three structures are spoken of by oil men. One at Aldamas, one south of Guerrero which is 50 miles north of Aldamas and another at Linares about 50 miles south of Aldamas. A couple of wells were drilled at Linares a couple of years ago. The Mexican Government well tested last week is due south of the Mirando Field in Zapata and Webb Counties, Texas, and is nearly due south of Roma in Starr County. It is presumed to be a continuation of the geological conditions that result in oil being found in the Mirando Field, the Reynosa Escarpment crossing into Mexico. Surface formation at the Mexican well is said to be Cook Mountain.

Refugio Gas Field

The most important event of the week in the coast territory around Corpus Christi was the Houston Gulf Gas Co.'s No. 6 Shelly in a new sand at 3,290-3,305 feet which had a rock pressure of 1,075 pounds and is estimated at 60,000,000 feet. It was brought in through choke and allowed to clean itself gradually and the volume has not been gauged, but it looks like a big fine well and is the first time that sand has been drilled into. It promises to greatly increase the potential gas supply from that field which is already from shallower sands supplying both the Houston Gulf Gas Co. line to Houston. The Houston Oil Co. has already started one of its wells down and is drilling at 2,600 feet in the No. 2-A Rooke, which is already past the sands in the field now producing.

Houston Gulf Gas Co. some weeks ago completed its extension of its gas line from the Refugio Field to the White Point Field. Houston Oil Co. last week completed its No. 1 Roos on a lease in which the mineral deed is owned in fee by Sun Oil Co. In sand at 1,950-58 feet it is about a 20,000,000-foot gasser and is in the White Point district in San Patricio County, 50 miles south of the Refugio Field. Houston has started to lay an extension of its line from Refugio to the White Point Field and has laid a line from the Cartwright Field in Live Oak County to Kingsville. The main line from the Mirando Field, through the Cartwright Field and on to Houston is thus tapped to supply Kingsville with gas, the supply from the Kingsville Field not having developed thus far.

Laredo Field

In the Laredo Field little developed the past week except that O. W. Killam has started his deep drilling campaign. Mr. Killam announced last spring that he would start such a campaign late this summer. Thus far all the production in the Laredo Field is relatively shallow. The deepest production is gas at 3,000 feet in the Carolina-Texas Field. The oil production is none of it from deeper than around 2,200 feet. Most of it much shallower. Mr. Killam proposes to drill wells to around 4,000 or even 5,000 feet. A very few wells in the Mirando country have gone to 4,000 feet.

MIRANDO TERRITORY COMPLETIONS

Jim Hogg County

Magnolia Petroleum Co.'s No. 27 Merchants State Bank, Survey 415, Randado Field, at 1,240 feet, is a 35-bbl. well.

Webb County

T. P. Morgan's No. 2 de la Garza, Survey 335, Block 23, Carolina-Texas Field at 2,550 feet has been abandoned.

Breen-Woodward have abandoned location made in Survey 684 of the Carolina-Texas Field for the No. 2 Webtser.

Pittman & Moriarty's No. 7 Puig, Block 4, Aviator Field, has been abandoned at 1,696 feet after casing collapsed at that depth.

New Locations

Pittman & Morarity's No. 8 Puig, Block 4, Aviator Field, in Webb County.

O. W. Killam's No. 1 Canales, San Antonio Balueart grant, in Jim Hogg County.

R. M. Strum's No. 1 Lopez in Survey 309, in the Andrews Pool in Webb County.

SAN ANTONIO DISTRICT COMPLETIONS

Caldwell County

The Texas Company's No. 2 Beatty, Dale Field, in Caldwell County, at 2,008 feet, gauged 250 bbls. first hour with valve partly closed and is making at the rate of 1,200 bbls. daily into storage.

Magnolia Petroleum Co.'s No. 17 Rios in the Luling Field at 2,140 feet is a 25-bbl. well.

Kleberg County

Humble Oil & Refining Co.'s No. 4 Kleberg at 3,062 feet is pumping a few barrels of oil and lots of water daily; No. 2-B Dennett, total depth 2,860 feet, plugged back to 2,300 feet and will be completed as water well at 680 feet.

Medina County

Witherspoon Oil Co.'s No. 1 Nixon, Survey 527 in the Adams gas field at 962 feet is 1,000,000-foot gas well.

Refugio County

Houston Gulf Gas Co.'s No. 6 Shelly, deep test drilled on acreage of William F. Morgan, Inc., at 3,290-3,305 feet is a 60,000,000-foot gas well with rock pressure of 1,000 pounds.

Bexar County

Humble Oil & Refining Co.'s No. 2 Yturri, A. Stafford Survey, topped chalk at 1,239 feet and has been abandoned at 1,252 feet.

New Locations

D. Hewitt is unloading derrick timbers at Pettus for the No. 2 Ray in Bee County.

F. A. Lain and F. A. Brown's No. 1 Edwards in the Hooper & Wade Survey, in Frio County is moving out lumber for derrick.

Ed Leach's No. 1 McWhorter in Live Oak County has derrick up and moving in machinery, with location 175 feet south of Lagarto Creek and 175 feet west of Nueces River.

Mission Drilling Co.'s No. 2 Cage in the White Point gas district in San Patricio County, has set and cemented surface casing at 400 feet.

McMullen County

E. R. Marts in the old Crowther Field in McMullen County made location for the Nos. 11 and 12 Poitevent and for the Nos. 1 and 2 Farmers Insurance.

Milam County

Bendick & Marks' No. 1 B. Young is location in the B. Young Survey, 700 feet to center of west line.

Noack & Laning's No. 1 Lowenstein is location in the William Allen Survey.

(Continued on Page 333)

SOUTHWEST TEXAS WILDCATTING OPERATIONS QUIET LAST WEEK

By B. D. Stevenson

SAN ANTONIO, Tex., Sept. 19.—Wildcat operations in Southwest Texas last week were the quietest in months. The Schlessinger Oil Corp. in Duval County, 20 miles northeast of the Carolina-Texas Pool in Webb County, was setting casing late last week. It tested some oil and gas in a sand at 2,396-2,401 feet on a drill stem tester. The test was not entirely satisfactory. When the drill stem was run in the hole an attempt was made to open the tester. It was later discovered that it was not opened but opened later and when the drill stem was closed and brought out of the hole it brought some mud and oil and showed some gas. It was then decided to set casing and test. This well was reported last week. It is up the Reynosa escarpment from the Carolina-Texas Field and with the Humble and Reiter-Foster midway between with a little oil in two wells and trying to get a well that will make a good, worth-while producer.

Milham is down 5,000 feet in Starr County in the No. 2 Salinas and Commonwealth Oil Co. is on a rock in its No. 1 Garcia in the same county in Survey 538. Cole Petroleum Co. is drilling at 4,600 feet in its No. 36 Benavides in Webb County 4 miles west of the Cole Field. The well was reported as a gas well of big volume at 2,324 feet but was deepened.

Rather more new locations were announced the past week than for some time. F. A. Lain and F. A. Brown are rigging up in northern Frio County on the L. D. Edwards farm 15 miles south of the Ina oil field and Adams gas field in Medina County and 100 miles due north of the Mirando Field. Lain is also preparing to drill a wildcat in Live Oak County on an anticline north of the Cartwright gas field of the Houston Oil Co. Ed Leach is starting a test south of the Cartwright gas field. McConnell is starting a test in McMullen County and Roxana has leased the south pasture of the George West ranch in Live Oak County, a tract of some 30,000 acres, and it is understood will drill a well on it some time soon. D. Hewitt, who is drilling the No. 1 Ray in northern Bee County is moving in derrick timbers to drill another.

Also in Medina County there is considerable talk of additional wildcatting to the northeast of the Adams gas field. Operators have been hunting diligently for the oil that they think should be somewhere around that field and thus far have not found it. From the Adams gas field northeast considerable distance to where Schermerhorn Oil Co. drilled and got a little showing of oil, there is new talk of doing some wildcatting.

Duval County

Schlessinger Oil Corp.'s No. 1 Moody, Survey 60, located 330 feet to north line and 1,650 feet to east line, at 2,396-2,401 feet tested some oil and gas and is preparing to set casing. National Oil Co.'s

(Continued on Page 334)

Rex Chabelco 1030 D.W.3 and 1240 D.W.4 are A.P.I. Chains

Rex Chabelco 1030 D.W.3 is an A.P.I. 3-chain.
Rex Chabelco 1240 D.W.4 is an A.P.I. 4-chain.
The tensile strength of 1030 D.W.3 is 40,000 pounds.
The tensile strength of 1240 D.W.4 is 85,000 pounds.
They have conformed to the A.P.I. specifications since early in 1926.
They have full A.P.I. recognition.
Stocked in all active oil fields.

CHAIN BELT COMPANY
719 Park Street, Milwaukee, Wis.
1000 Keystone Bldg., *Houston, Texas* 1414 Santa Fe Ave., *Los Angeles, Calif.*

REX
(Reg. U. S. Pat. Office)

DEEP WELL
CHABELCO

Spindletop Has Best Well in Gulf Field

Two 1,500-Bbl. Wells in West Pierce Junction. Big Creek Has 2,000-Bbl. Completion. Production Declines

By Staff Correspondent

HOUSTON, Tex., Sept. 21.—Big wells in Spindletop, Pierce Junction and Big Creek furnish the new flush production in the Gulf region during the past week while all other areas were comparatively quiet. Production after climbing for two consecutive weeks showed a decline. Leasing and geophysical work is continuing at a steady pace in several sectors of the Gulf Coast region.

Gulf Production Co.'s No. 3 McLean "A" in Spindletop was the banner well of the week. It is an old well drilled deeper and was completed making 3,600 bbls. daily. Several wells in the Spindletop Pool are expected to be completed within the next 10 days.

In Pierce Junction two 1,500-bbl. wells were completed, both on the west side of the dome. One was completed by the Rio Bravo Oil Co. and the other was completed by Anderson and Plummer. The biggest well completed in that pool during the week was Leonard Petroleum Co.'s No. 1 Gilmore which made 1,680 bbls. initial.

A 3,600-foot test was abandoned in Blue Ridge and a couple of small wells were completed. Big Creek scored late in the week with a 2,000-bbl. well when The Texas Company's No. 2 Weate was completed at 3,825 feet. One other small well was completed in that pool during the week. A small well was completed in the West Columbia Pool and the Roxana Co., junked a deep test at 6,300 feet. Pure Oil Co. and Humphrey's No. 1 Armstrong in Brazoria County was abandoned in salt water at 4,421 feet.

Louisiana Active

Field work in the Evangeline Field in Acadia Parish in Louisiana showed an increase during the past week and Cline and associates' No. 1 Cline is testing an oil show at 1,760 feet. Yount-Lee Oil Co.'s No. 1 tested salt water in a showing at 2,535 feet and is drilling ahead at 2,710 feet. Gulf Co. abandoned a 4,150-foot test in the Edgerly Pool. Hercules Oil Co.'s No. 1 Paraffine cored sand showing oil at 3,992 feet and at 3,985 feet. Rock salt was cored at 3,992 to 4,000 feet and the bit went out of that formation at 4,000 feet. The test is being bailed. Field work in the Lockport Pool showed a slight increase but no new wells were reported from that area last week.

Pure Oil Co.'s No. 3 Sweet Lake in the Sweet Lake Pool of Cameron Parish came in flowing 72 bbls. per hour from a total depth of 5,897 feet. The well was making a little water and sand and sanded up 24 hours later. It is being cleaned out and a liner is to be run. Pure Co. has three other wells in Sweet Lake that are nearing the pay and a strainer is being lowered to test one of the trio.

Wilson-Broach Oil Co.'s No. 4 Wilson in the Edgerly Pool which came in on September 8 making 1,500 bbls. daily is holding up well. It is being produced through a one-half inch choke and produced 1,500 bbls. on the 15th. The oil is 24.5 gravity crude. In the same pool Gulf Refining Co.'s No. 43 Bright Penn which came in making 2,000 bbls. at 3,425 feet more than a week ago, went dead. The well is being put on the pump.

Shooting crews are working in Hardin, Liberty and Jefferson Counties. One crew is shooting around Lost Lake and Galveston Bay and another at White Ranch in Jefferson County. Crews are active in Cameron, Vermillion, Lafourche, Beauregard and in Calcasieu Parishes. One crew is preparing boats to shoot Mallard Bay in Cameron County. Among the recent leases taken was a 75-acre lease in the J. H. Barfield Survey, Section 69 on the northeast edge of Sour Lake by the Humble Oil & Refining Co.

Testing Gas Area

The Edna gas area in Jackson County will probably get its final test within a short time. There is considerable gas in the small area but a big volume of salt water accompanies the gas and efforts so far to shut out the water have been unsuccessful.

Balew Oil Co. has taken over a 5,000-acre block south of Garrison in Nacogdoches County. It is reported the company obtained the block with a drilling obligation and will start a test on it sometime in the near future.

The Edgerly Pool in Louisiana figured in two large deals during the past week. The Yount Lee Oil Co. of Beaumont is reported to have paid $225,000 for the stock of the Bright company which owns an overriding royalty on various leases in the Edgerly Pool.

Later in the week The Texas Company is reported to have leased 600 acres from the Miller Brothers Realty Co. of Lake Charles, and in the Edgerly area for a reported price of $90,000 cash. The closing of the deal is being held up pending the examination of titles. During the past few weeks activity in the Edgerly area has been steadily increasing.

Reiter-Lewis' No. 1 Mary Ward in Cedar Creek, Limestone County is continuing to hold up as a good producer but is reported to be showing a little water. The well is rated as a 500-bbl. well at a total depth of 2,883 feet and eight feet in the pay. The oil is 32.6 gravity crude. The next test of interest in that area is the Rycade Oil Co.'s No. 1 Mary Ward in the NW cor. of the east 50 acres of the Mary Ward tract and the east offset to the wildcat producer. It is in the bottom of the chalk at 2,435 feet and scheduled to hit the pay sometime during the coming week. Other wells drilling in that area are drilling at shallower depths.

Production of the Gulf Coast region declined 1,724 bbls. in comparison with the previous week's report. However, the flush production of the current week is expected to halt that decline. The decline was general in several pools of the entire Gulf Coast region.

The demand for Gulf Coast crude is revealed in the storage report for the month of August. August storage figures for the Gulf Coast region showed a decrease of more than 2,000,000 bbls. during the month and on September 1 there were 11,112,631 bbls. in steel storage and 3,792,382 bbls. in earthern storage. On August 1, the steel storage was 13,102,014 bbls. and the earthen storage was 4,273,641 bbls. in the Gulf Coast fields.

The storage report for Texas, Louisiana and Arkansas shows that 100,142,000 bbls. of crude was in storage in those States on September 1. On August 1, there was 100,762,000 bbls. in storage in the three States—a decrease of around 620,000 bbls. during August. North and West Texas stocks increased around 3,000,000 bbls. during August and North and South Louisiana both showed increases in storage.

Production Declines

The average daily estimated production of the Gulf Coast region, including the fields of southern Louisiana for the week ending September 17, was 145,566 barrels, representing a decrease of 1,724 barrels from that of the week closing September 10. Production was distributed as follows:

Batson	1,310
Big Creek	2,675
Boling	2,470
Blue Ridge	4,950
Barbers Hill	875
Damon Mound	915
Goose Creek	8,325
Hull	14,650
Humble	4,200
High Island	122
Kingsville	375
Markham	250
Moore's Field	150
Nash Dome	872
Pierce Junction	8,900
South Liberty	2,360
South Dayton	380
North Dayton	240
Sour Lake	4,120
Spindletop	56,000
Saratoga	1,150
West Columbia	8,625
Orange	4,675
Edgerly	2,800
Jennings	1,300
Lockport	5,700
Vinton	5,137
Starks	950
So. Louisiana	1,100
Totals this week	145,556
Totals last week	147,280
Difference	1,724

East Central Texas

Mexia	9,677
Cedar Creek	530
Nigger Creek	2,143
Currie	651
Wortham	2,796
Richland	756
Powell	14,750
Total	31,302

Southwest Texas

Somerset	2,585
Lytton Springs	1,880
Dale	195
Luling	16,570
Miscellaneous	9,790
Total	31,020

Jefferson County

Spindletop was back into the limelight during the past week with a 3,600-bbl. well and a shallow pumper. Gulf Production Co.'s No. 3 Morris McLean A, was the banner producer and is an old well deepened from 4,633 feet to 4,889 feet and completed as a 3,600-bbl. well making 30 gravity oil. The well is flowing through a three-quarter-inch choke. The Gulf Co.'s No. 225 Gladys was completed as a 44-bbl. pumper at 696 feet.

Hines Oil Co.'s No. 1 Weed which blew out at 5,075 feet making around 7,000 bbls. of fluid last week and which caused considerable damage to the rig, is shut down for rig repairs. Sun Oil Co.'s No. 7 McLean is drilling at 4,250 feet; No. 11 is a derrick; No. 6 is drilling at 5,275 feet; No. 12 is drilling at 4,860 feet and No. 14 McLean is drilling at 5,625 feet. Sun Co.'s No. 4 Price is drilling at 3,050 feet. Rio Bravo Oil Co.'s No. 3 T. & N. O., is down 3,995 feet and the strainer is being set. Magnolia Petroleum Co.'s No. 5 fee is to be deepened from 4,430 feet. Same company's No. 2 fee A is drilling at 5,090 feet and No. 6 fee A is drilling at 5,270 feet.

J. O. Davis' No. 2 Gladys is drilling ahead at 4,900 feet. The Gulf Production Co.'s No. 8 Jeanette Mann is down 4,150 feet and a strainer is being set. Gulf Production Co.'s No. 12 Oakwood Realty Co. is drilling at 5,575 feet and No. 11 Marrs McLean A is drilling at 4,775 feet. Location is being made for Gulf Co.'s No. 226 Gladys.

Four miles northeast of Spindletop Deep Test Oil Co. is sidetracking at 2,165 feet at No. 1 McFaddin. Gulf Production Co.'s No. 4 Bordages at Fanette is a location. Three miles northwest of Beaumont Beaumont Oil & Prospecting Co.'s No. 1 Tyrell is drilling gumbo at 2,685 feet. Five miles northeast of Port Arthur Jim McMurry's No. 1 Crosby is drilling soft sandy shale at 1,410 feet. One mile west of Nederland South Spindletop Oil & Development Co.'s No. 1 Young has been temporarily abandoned in gumbo at 1,653 feet.

Harris Junction

Three good wells were completed in the Pierce Junction Pool during the week. On the west side of the dome Rio Bravo Oil Co.'s No. 8 P. F. Settegast made 1,500 bbls. initial from 4,375 feet. Anderson and Plummer's No. 1 Whitehead is making 1,500 bbls. of 27 gravity oil daily from 4,480 feet. Leonard Petroleum Co.'s No. 1 Gilmore was the best of the completions in Pierce Junction when it came in making 1,680 bbls. from 4,650 feet.

Rio Bravo Oil Co.'s No. 2-B in Pierce Junction is to be drilled deeper and No. 6-B is a location. Same company's No. 6 P.S.A. is being delayed by a fishing job at 3,430 feet. Woodard and Lee's No. 3 Settegast is shut down at 3,200 feet. Navarro Oil Co.'s No. 3 Cain is drilling at 2,900 feet. Gulf Production Co.'s No. 21 E. R. Taylor and others is drilling at 1,400 feet. Same company's No. 1 H. M. Perry is being rigged. H. R. Cullen and associates' No. 8 Howe is drilling at 4,800 feet.

Twelve miles northeast of Houston P. S. Griffith's No. 2 fee is shut down in gumbo at 3,517 feet. At Hockley Marland Oil Co. and Humble's No. 1 Warren is drilling shale at 4,060 feet. At Humble Sun Oil Co.'s No. 42 River is being washed after 1,046 feet of 4¾-inch was set at 3,846 feet. In the same pool Gulf Production Co.'s No. 1 Burt Griffith is drilling sticky shale and lime at 4,175 feet.

In Goose Creek, Humble Oil & Refining Co.'s No. 72 Simms-Smith went into salt water at 4,460 feet. Same company's No. 4 Ashbell-Smith is to be deepened. Dort Oil Co.'s No. 1 Grace Adey is being rigged to deepen. Southern Exploration company's No. 7 Freeman is fishing at 3,000 feet. Gulf Production Co.'s No. 14 Chapman-Bryan is drilling at 5,275 feet; No. 8 Hoffman Gaillard is drilling at 1,800 feet; No. 26 Ashbel-Smith is drilling at 4,600 feet and No. 11 State Land-Producers is being rigged to drill deeper.

Orange County

In the Orange Pool, Rycade Oil Co.'s No. 11 State B is being rigged up to deepen. Texhoma Oil Co.'s No. 16 Chesson is shut down at 3,350 feet and No. 8 Chesson is being washed after the strainer was set at 3,050 feet. Brownie-Babbittee Oil Co.'s No. 1 Peveto is being put on the pump at 2,775 feet. Sinclair Oil & Gas Co.'s No. 4 Granger is drilling at 3,040 feet. Gulf Production Co.'s No. 15 Lee Hager fee is to be deepened from 4,650 feet. Sun Oil Co.'s No. 2 Brown is being rigged to deepen.

Liberty County

In the Hull Pool Republic Production Co.'s No. 45 Dolbear is drilling at 1,925 feet and No. 54 Dolbear is drilling at 2,130 feet. The Texas Co.'s No. 7 Merchant is to be deepened. The Texas Company's No. 5 Hannah Vacuum is drilling at 2,575 feet and location is being made for No. 7 Big Dome Interests' No. 3 Palmer is shut down at 1,560 feet. Gulf Production Co.'s No. 29 Phoenix Development Co. is drilling at 3,550 feet. Same company's No. 11 W. L. Thomas fee is drilling at 2,710 feet. In the Liberty Pool Navarro Oil Co.'s No. 10 Harrison is drilling at 3,400 feet. Location has been abandoned for Gulf Co.'s No. 1 Hinton at South Dayton. Harrison Oil Co.'s No. 2 Quintette in North Dayton is drilling at 1,890 feet in hard sand. Judge Titwell and associates' No. 1 Gardner, 5 miles east of Davis Hill, is drilling gumbo at 3,508 feet.

Hardin County

In the Batson Field, The Texas Company's No. 1 Sterling is drilling at 2,750 feet. S. R. Buchanan's No. 94 Milholme is a 5-bbl. pumper at 730 feet. Charles Hooks' No. 1 Lejarza is drilling at 1,375 feet. Capital Oil Co.'s No. 8 Hodges is flowing 250 bbls. from 3,450 feet. East Batson Oil Co.'s No. 5 Bates is drilling at 475 feet. Paraffine Oil Co.'s No. 70 Paraffine is being bailed at 975 feet. Ada Belle Oil Co.'s No. 116 Honey-

(Continued on Page 330)

The SHEARER Portable Steam Hammer

Fourteen years of unimpeachable service now supplemented by refinements that take drudgery and danger away from drilling, as far as bit dressing goes.

Used with profit to dress all Cable Tool Bits from six inches up, also for dressing straight reamers, for cutting defective bits, welding stems and all such work in connection with drilling wells.

Operating either with steam or compressed air, the Shearer Hammer is adaptable to all well drilling operations, for field shops, and for repair centers. It is quickly installed, quickly taken down and moved. To set-up and dismantle the hammer is a simple matter, thus making it a really portable outfit in every sense. Yet when installed it is sturdy and much more flexible than a stationary hammer.

Butler Portable Steam Hammer Co.

5310 Westminster Place, Pittsburgh, Penna.

Makes Bit Dressing Easier, Safer *and* Inexpensive

The Shearer Portable Steam Hammer in its new and greatly improved model (displayed at the Exposition) has always held its lead as the first and the finest implement of its kind for dressing work. Altho it has been imitated—it has not been equalled.

It is now, first of all, fool proof against damage in operation; second,—it is easier to operate because it has a wide range of angle adjustments all of which may be made rapidly and with ease; third—it is the safest of any bit dressing machine.

The Hammer saves one heat in dressing any bit that requires two heats when dressing is done with a ram. Therein lies its great economy.

Yet there are many other features that are nearly as important, and you should know them. They include: absolute safety in dressing, a remarkable saving in labor (dressing time and dressing trouble); securing heavier lugs with corners out to gauge—thus helping to eliminate "tight hole;" keeping the bits in service a great deal longer; cutting down the cost of dressing in every phase of the work.

Don't feel you have to buy a hammer if you use this coupon to get a description of it. If you have any connection whatever with tool dressing you should know about this wonderful machine. Allow us to explain its features. Send your name in now for the latest information.

COUPON

Please send description and instruction of Shearer Portable Steam Hammer to—

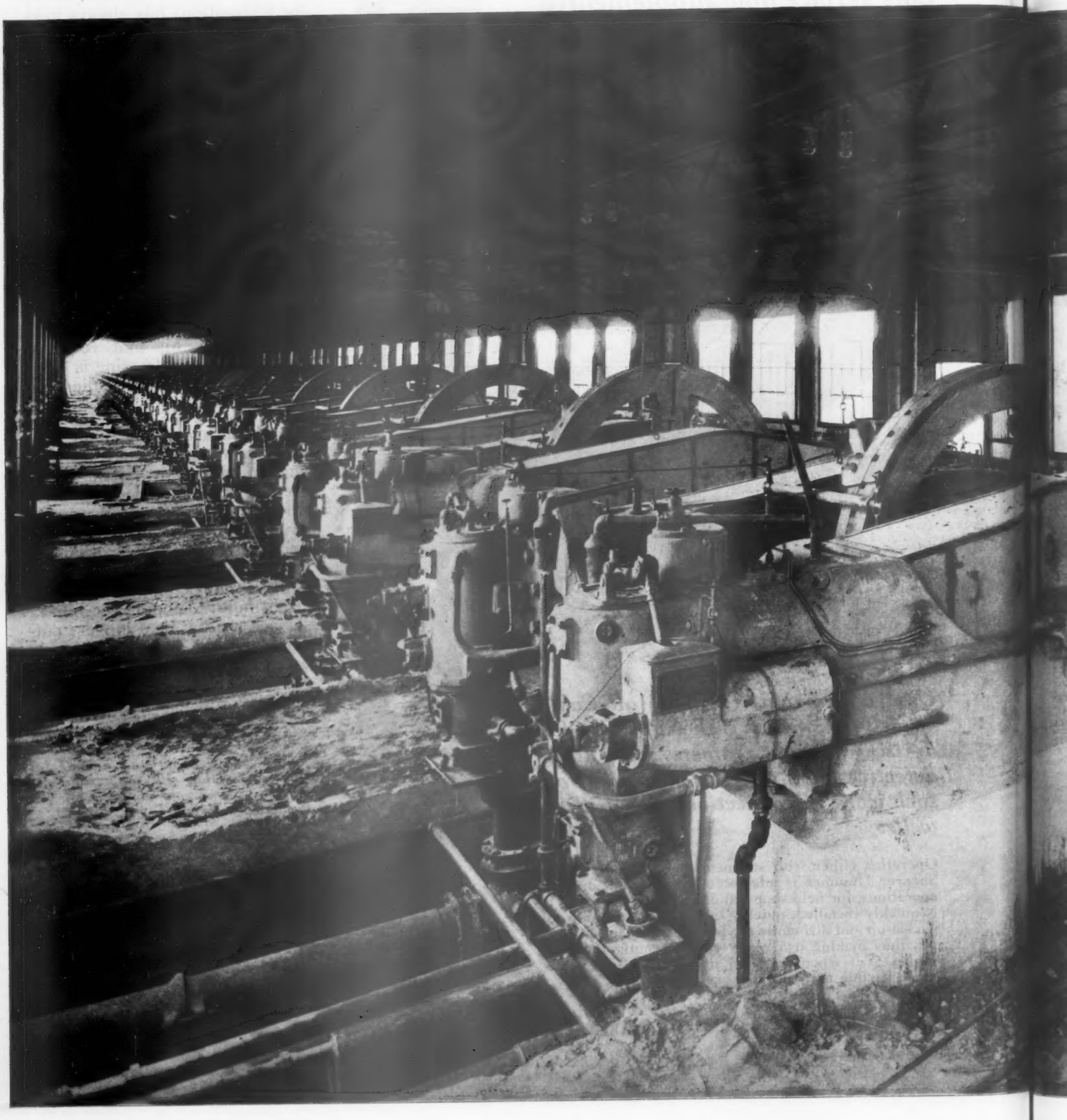
.....

.....

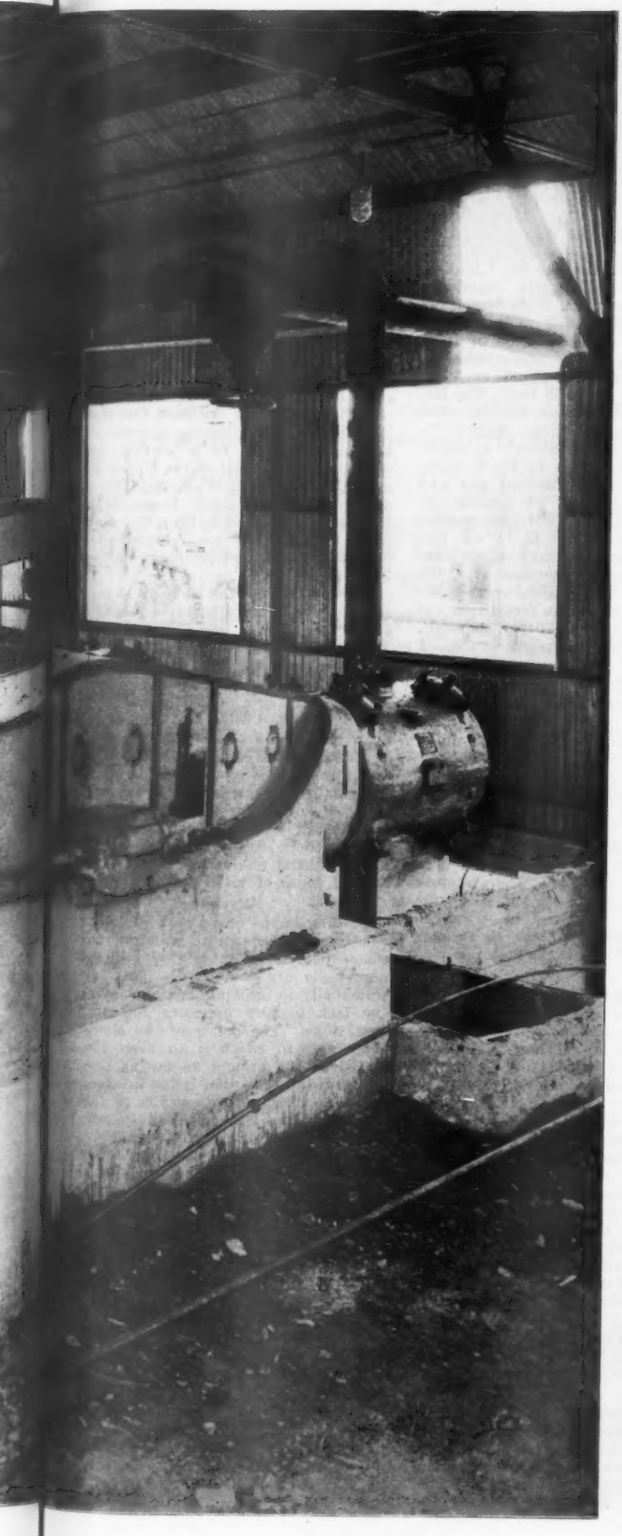
Town .....

State .....

THIRTY-TWO



COOPERS IN A ROW



In one of the largest and most modern gasoline plants in the whole country the Sinclair Oil and Gas Company is installing thirty-two Cooper Type-80 twin engines. The photograph shows the plant under construction.

How unnecessary it is even to mention the many superior features of Cooper engines and compressors, when a company, after having turned to Coopers less than three years ago, chooses them for such an important station.

The C. & G. Cooper Co.
Mount Vernon, Ohio

Dallas, Texas **Tulsa, Okla.**
Los Angeles, Calif.

New Wells in Rocky Mountain Area

Sinclair Starting in Parallel Structure South of Boulder Field. New Mexico Well Makes Another Flow of Gas

By Tolbert R. Ingram
Staff Correspondent, Rocky Mountain Area

DENVER, Colo., Sept. 17.—The Rocky Mountain area reported a number of small completions, the starting of several important tests in widely separated distr cts, and less than the usual number of abandonments. In Colorado, the Sinclair interests are starting a new test on the Parallel structure, 3 miles south of the old Boulder Field, after failing to reach the objective in a well drilling for more than a year. The General Petroleum Corp. is surrendering its Montrose County leases after drilling three tests on the Paradox anticline, all of which had shows of oil and gas and very thick beds of salt. Texas Production Co. is drilling in the Sundance on the Rangely Dome; the Midwest Refining Co. is about ready to test the same horizon on the Iles Dome, its No. 18-SD making gas and spraying oil just above the objective, and the Texas Production Co.'s Sundance sand test on the Moffat Dome is still testing production in the Morrison before going into the objective.

Wyoming reports a slight letup in drilling operations in Salt Creek, four small completions in the Wall Creek sand in that field and a number of completions in scattered areas. Producers & Refiners Corp. has a 30,000,000-foot gas well in the Big Sand Draw and the Ohio Oil Co. has a 125-bbl. well in the Rock Creek Field. The Texas Production Co. is installing a rotary in the Big Muddy in an attempt to test the Lakota sand in a new hole after being unable to finish the old hole.

The Texas Production Co.'s No. 1 Rhodes, in Lea County, New Mexico, continues to attract attention upon striking another flow of gas. Midwest Refining Co. is starting one new test and abandoning an old one in the southeastern part of the state. Several completions, none of them very large, are reported from Eddy County, and the San Juan Basin reports little outside of the ordinary.

Utah reports two wells nearing the completion stage, resumption of drilling at Boundary Butte, and miscellaneous wildcat reports.

Colorado

The Repollo Oil Co., a subsidiary of the Sinclair Consolidated Oil Corp., is moving in material for its No. 1 Nichols, in the SE cor. NE Section 32-1n-70, on the Parallel Dome, 2 miles east of Boulder, in the county of the same name. The decision to make another attempt to reach the sands in the Dakota on this structure indicates that the company has lost none of its faith in the possibilities of this area as a result of drilling already done. So far, the objective horizon has not been penetrated, though drilling has been in progress since May, 1926.

The Parallel structure lies about 3 miles south of the old Boulder Field. That field attracted considerable attention in 1901 when No. 1 McKenzie, Section 21-1n-70, had a showing of oil at 2 720 feet. An extensive drilling campaign la ted over a period of 10 years and at one time there were as many as 120 derricks up and 82 wells drilling. The following year the pool produced 11 800 bbls. In 1909, it reached its peak with an output of 85,709 bbls., since which time the production gradually declined until now it is less than 25 bbls. a day from several of the old wells. The oil came from sandy lenses in the Pierre shale and no true oil sand was found. Testing of the area, mostly some distance out from the limits of the old pool, has since taken place at intervals, but the source of the production has never been found.

The Repollo Oil Co. started a test in May, 1926, in its No. 1 Deines, NE NW Section 33-1n-70, as a joint operation with the MacKinnie Oil & Drilling Co. This was on what was named the Parallel Dome from its location on the fortieth parallel. The structure is separated from the old Boulder monocline by the Valmont Dyke, a major fault running in a general east-west direction. Paul B. Whitney, formerly geologist for the Continental Oil Co., is credited with having worked out the geology and established the closures. He did considerable trenching in mapping the structure, and worked out some theories of his own as to the origin of the oil found in the Boulder Pool. Most of the drilling previous to the starting of the No. 1 Deines had been to the north and east of the Valmont fault, and some of these wells were carried very deep, one near Longmont being drilled to 7,300 feet. The Dakota was the objective in these tests and, wherever reached, it contained water. The 7,300-foot well, however, did not reach that horizon. The few tests drilled to the south of the fault were dry, and this absence of water was one of the determining factors in the decision to make the Deines test.

Had Oil and Gas Show

No. 1 Deines encountered 500,000 feet of gas at 1,808 feet. At 3,400 feet, it went into a black sandy shale showing some oil. The fluid rose 1,100 feet in the hole over night. At 3,430 feet, the oil had risen 2,400 feet and at 3,450 feet, the fluid stood 3,000 feet in the hole. An effort to shut off the horizon with 8¼-inch casing was not entirely successful and at 3 554 feet, oil was still coming in. This horizon consisted of about 30 per cent shale and 70 per cent sand and is called the Hygiene formation. No test was made as the objective was the Dakota sands expected at 4,700 to 5,200 feet. After many delays and casing and other troubles, the hole finally reached a depth of 4,730 feet, believed to be close to the first sand in the Dakota Gas coming into the hole from the bottom, blew the tools upward where they lodged and started the trouble that finally resulted in the abandonment of the attempt to reach the Dakota. The hole has been plugged back to the oil horizon at 3,400 feet, and a test will be made shortly.

In the meantime, the Offset Oil Syndicate started its No. 1 Odlum, 660 feet north of No. 1 Deines, in Section 28-1n-70, the objective being the Hygiene horizon encountered in the other well at 3,400 feet. It suspended drilling at 3,464 feet, 87 feet in the Hygiene sand, which was found only 2 feet lower than in the Deines test. Neither oil nor water was found and operations were discontinued awaiting the outcome of the other tests.

The Essok Oil Co. started its No. 1 Martin, NE cor. NW SE Section 5-1s-70, 1½ miles southwest of No. 1 Deines. The geology indicated that it was 200 to 450 feet lower than the pioneer well, but when the Hygiene was cut, it was found to be running a little higher. The Hygiene, however, failed to show any oil or water. It was decided to await the outcome of this well before doing any more testing, and drilling to the Dakota was resumed in the Martin well, but upon reaching a depth around 4 200 feet, one kind of trouble after another has been encountered, and no new hole has been made for several months. When it began to look as if this well could not reach the objective, it was decided to go ahead with another test which is being started in the Repollo's No. 1 Nichols.

Surrenders Leases

The General Petroleum Corp. is surrendering its leases on the Paradox anticline in Montrose County, following its decision to abandon its No. 2 Wilcox, Section 6-47-19, at 6,300 feet, the second deepest test drilled in Colorado and what is believed to be the largest hole at that depth, 10⅝ inches at the bottom, in America. The leases are being returned to John I. Mullen, who, it is reported, will make an effort to continue the prospecting. Three tests drilled involved an expenditure of around $500,000, the rotary test in No. 2 Wilcox costing $225,000.

The efforts to open a pool in Montrose County extend back over a period of several years, the first work being undertaken by the Cinco Minas Oil Co., of which James W. Gerard, former United States Ambassador to Germany, has head. Subsequently, the General Petroleum Corp. took over the Cinco Minas operation and put down the last of the three tests.

The first well drilled was No. 1 Mullen, Section 4-46-17, which was abandoned at 4,170 feet in salt and shale formation. It cut 2,400 feet of salt and had nine showings of oil and gas, some of them approaching commercial proportions. A gas showing was encountered at 1,700 feet, and another at 2,355 feet. The latter caught fire and burned the rig. The next test was No. 1 Wilcox, Section 35-48-19, which was abandoned at 3,548 feet in a 6¼-inch hole in black shale. At 1,717 feet, it encountered gas and oil, several barrels of 54 gravity oil being bailed out. At 2,284 feet another pocket of gas accompanied by oil was encountered, from which 4 bbls. were bailed. Another gas horizon at 2,465 feet blew water and mud over the derrick for 35 minutes. The formations cut in this well were about 70 per cent salt, compared with 40 per cent in No. 1 Mullen.

It was decided to install a rotary for the third test, No. 2 Wilcox, which is being abandoned at 6 300 feet after going through 5,000 feet of salt. The remaining 1,300 feet was mostly conglomerate, black shale, some lime and gypsum. Gas pockets were encountered at 830, 2,370 and 4,894 feet, and slight oil showings at 1,790 and 4,690 feet. Gas and oil showings were in evidence at 3,053 and 5,017 feet. The three wells were drilled near the apex of the anticline. The structure appears to be a salt dome similar to the Colorado River structures below Moab, Utah, and Mr. Mullen hopes to arrange for some flank wells to test out the theory.

Important Tests

Several of the tests to the Sundance sand in western and northwestern Colorado are at important stages. Midwest Refining Co.'s No. 18-SD SW, Section 23-4-92, Iles Dome, in Moffat County, is getting ready to drill in. It was in a fine gray sand at 3,278 feet which was making 6 000,000 feet of gas and spraying oil. It is estimated that 30 feet of additional depth will put it into the Sundance which showed for a 2,600-bbl. well in No. 4 Parkinson, one-fourth of a mile to the west and south. Same company's No. 34-SD, Section 22-4-92, is in gray sand at 2,685 feet, and No. 4-SD Shaw, NE Section 27-4-92, is in green shale and bentonite at 2,940 feet. The Texas Production Co.'s No. 1 Parkinson and No. 2 Parkinson, Section 23-4-92, are making progress in the bottom of the Dakota, the first being at 3,070 feet and the other at 3,100 feet.

The Texas Production Co.'s No. 10 Knowlton, Section 33-5-91, on the Moffat Dome, which has been on a test from the Morrison sand, just above the Sundance, at a total depth of 4 265 feet, flowed 136 bbls. and made 3,000,000 feet of gas in 24 hours ending Thursday morning. The test started off with a flow of 270 bbls. naturally the first day and 178 bbls. the second day. It may be deepened a foot or two and test continued a little longer before a decision is made as to drilling into the Sundance. In the meantime the company is deepening its No. 5 Wick, Section 10-4-92, to the Sundance. Drilling is in progress in shale at 4,110 feet.

The Texas Production Co.'s No. 2 Emerald, Section 31-2n-102, Rangely Dome, Rio Blanco County, is 10 feet in the Sundance sand at 3,750 feet. The sand so far has shown neither oil nor water. The Morrison at 3,550-64 feet, was good for 12,000,000 to 15,000,000 feet of gas. The Tide Water Associated Oil Co.'s No. 1 Amazon, Section 24-2n-103, had a 17-foot saturated sand at approximately the same depth, but did not prove commercial upon being tested. This well, which is being drilled with a rotary, has had more than its full share of bad luck recently, but hole has been cleaned of drill stem to bottom and new hole now is being made at 4,750 feet. It is reported that 6,200 feet of 6-inch drill stem has been ordered for this test to carry it on down to the Park City formation in the Carboniferous system. This horizon correlates to a certain extent with the Embar sand of the Upper Pennsylvanian in central Wyoming. The other deep test on the Rangely Dome, Midwest Refining Co.'s No. 2 Rangely, Section 30-2n-102, has not yet reached the old bottom at 3,037 feet and is redrilling at 2,837 feet.

Midway between the Rangely Dome and the Moffat County structures is the Wilson Creek Dome being tested by the Texas Production Co. in its No. 1 Freeman, Section 27-3-94, which had been held up for some time by cavey ground. It is now making new hole and is drilling in shale at 4,640 feet. This is a very deep test, the first sand in the Dakota not being expected under 5,500 to 5,700 feet.

Only one completion in Colorado was reported during the week, this being the Continental Oil Co.'s No. 3 Steinmier, Section 35-18-70, Florence district, which had an initial production of 4 bbls. from a total depth of 1,470 feet.

Wyoming

Drilling in the Salt Creek Field, which has been held down to a minimum for some time, is being further reduced as new wells are completed. This is due principally to the approach of winter and the lack of any necessity for pushing operations. The policy of the operating companies in effect is to keep the oil stored in the ground as far as possible and shut-in production is far in excess of pipe line runs. Requirements of the refineries of the Standard Oil Co. of Indiana and the Midwest Refining Co. at Casper were reduced some time ago by the discontinuance of shipments of gasoline to the Standard Oil Co. of Louisiana at North Baton Rouge for export to Europe. This order was obtained in July, 1920, since which time up to July of the present year, shipments went out of Casper at the rate of 6,000,000 to 8 000,000 gallons per month. The business now is being taken care of by one of the Standard of Indiana affiliated companies.

Four completions in Salt Creek were reported the past week. These were all in the First Wall Creek sand. Completions in that horizon have been more numerous of late than in the richer and deeper sands. Wyoming Associated's No. 22, SW Section 25-40-79, was completed

(Continued on Page 309)

Smooth and even wear

Hazard Wire Lines wear out, of course, but it takes a long time. With reasonable care a Hazard Drilling Line will wear down slowly and evenly, and will pay big dividends.

De Forrest Drilling Co. placed a Hazard Drilling Line in service on Johnson No. 2 well, Derby Oil & Refining Co., Borger, Texas, at 1,400 feet. Drilled to 2,960 feet—underreamed 1,530 feet on same well. Line in use swabbing after 60 days of the latter work. - - - None cut off except to resocket.

Hazard Wire Lines meet A.P.I. specifications

Hazard Wire Rope Co.
Wilkes-Barre, Pa.

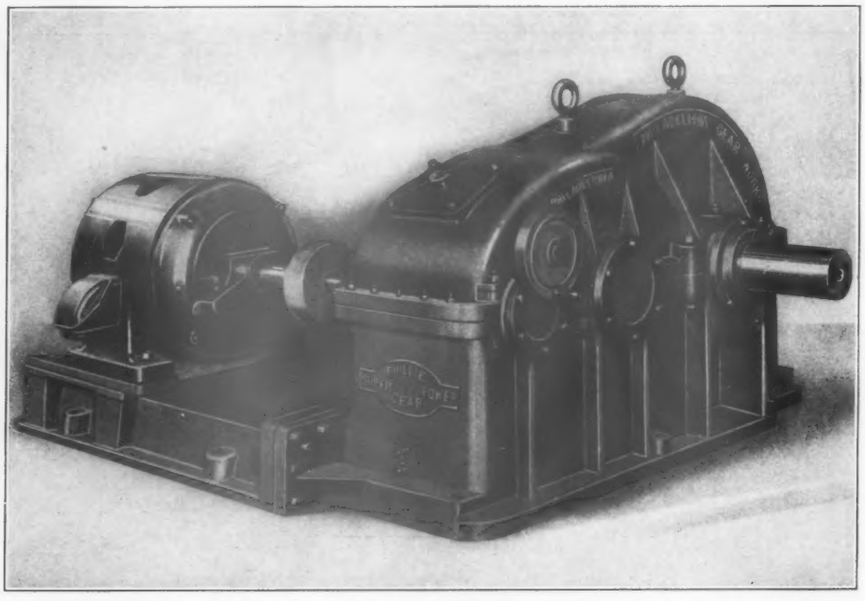
1625 South Troost Ave., TULSA
NEW YORK PITTSBURGH CHICAGO DENVER

Distributors in the Eastern Fields
CROTTY & CO.
Parkersburg, W. Va.
PRICHARD SUPPLY CO.
Mannington, W. Va.
DANSER SUPPLY CO.
Weston, W. Va.

Distributors in California
BUCK & STODDARD
Los Angeles

Distributors in Texas
LONGHART SUPPLY CO.
1st Nat'l Bank, Fort Worth, Texas
Distributors in Oklahoma, Kansas, and the Panhandle of Texas
BOVAIRD SUPPLY CO.
904 Mid-Continent Bldg., Tulsa, Okla.

HAZARD



The above Unit is equipped with steel cut Herringbone Gears and hardened Nickel Steel Pinions. The High and Second Speed Shafts are mounted on Timken Bearings, while the Final Drive is mounted on ring oiling Bronze Bearings. The necessary Speed changes for "Pumping" and "Pulling" are easily accomplished by the single turn of a (properly indicated) Hand Wheel, on the outside of the gear casing. This is an "exclusive" Philadelphia Feature,—and eliminates the necessity for removing cover of gear casing and the changing of gears.

Announcing the New

Philadelphia

OIL PUMP GEAR UNIT

to be displayed during the TULSA EXPOSITION

Sept. 24 to Oct. 1

This 2-Speed Philadelphia Oil Well Pump Unit embodies "exclusive features" of design and construction which have proven to be "the last word."

We shall welcome the opportunity to go over this Unit in detail with you, and show it to you IN OPERATION,—AT TULSA.

Oil Well Pump Units made by Philadelphia, are not new,—they have been successfully used in the Texas, Oklahoma and California Fields, and have proven their "true worth."

The NEW PHILADELPHIA 2-SPEED DOUBLE REDUCTION UNIT is merely a "great improvement" upon a previously satisfactory apparatus.

See this Unit "in operation" during the TULSA EXPOSITION.

NOTE [The Philadelphia 2-Speed Double Reduction Oil Well Pump Unit is the result of nearly a Half Century's Experience in the making of Gears and allied Power Transmission Devices.] NOTE

Main Office and Plant
Erie Ave. and G St.
Phila., Pa.

PHILADELPHIA GEAR WORKS

Manufacturers of Industrial Gears and Speed Reducing Units

Mid-Continent Distributers—Petroleum Electric Co.
217 E. Archer St., Tulsa, Okla.

California to Maintain Big Production

Indications at Present Point to Output of at Least 600,000 Barrels Daily During the Next Six Months

By L. P. Stockman
Staff Correspondent, California Fields

LOS ANGELES, Calif, Sept. 17.—Although California daily production has been well above the 600,000-bbl. mark all year and probably will continue at this rate for the next three months, the total output has shown several violent fluctuations from time to time, due to a number of reasons, not the least of which has been the periodic ups and downs of Seal Beach resulting from the intensive town-lot drilling in the Alamitos Heights section which caused that field to show two distinct highs, one of 60,000 bbls. a day on May 10th of this year and the other of 75,000 bbls. daily on June 21, last. Drilling in the older area of the Seal Beach Field, where the Associated, Marland and Standard are preserving a nice reserve for a rainy day, is going along at a normal rate with all three companies wisely conserving their resources for better prices. The opening up on September 1 of the production in the Ventura Avenue Field, which had been shut in on May 1 by the Associated, Shell, General Petroleum Corp. and Bolsa Chica, also was a contributing factor to the several major fluctuations during the first nine months of the current year.

Another increase in State production appears in the offing as the daily output of the Seal Beach Field has shown a definite upward trend during the past two weeks and should be further strenghtened by several recompletions within the next few days. Present indications all point to the establishment of a new production high at Seal Beach along around the end of September, due primarily to deepening operations under way in the Alamitos Heights or town-lot section of the field, where the lower horizons are proving exceptionally productive. This area cannot be expected to sustain intensive town-lot development for more than a limited time, however, and for this reason production curves at Seal Beach undoubtedly will register a sharp peak followed by a rather heavy drop after the present heavy gas head has been diminished. Compressors have not proven any great boon at Alamitos Heights up to the present time, but artificial production methods probably will meet with better success when applied to the lower zones after production falls off, as the deep Wahl and Wasem horizons should prove more susceptible to artificial stimulation, because of higher saturation and greater thickness.

Wells Near Completion

Operators are nearly all holding back information, but it is no secret that something like 500 feet of oil sand has been opened up below the upper, or Selover horizon on top of the structure in the town-lot section. After cementing off the watersand around 4,700 feet, it is clear sailing down to about 5,200 feet. The lower depth mentioned is a rather arbitrary figure, and a conservative one, too, for up to the present time no one has definitely drilled entirely through the lower zone and hence the entire thickness has not yet been ascertained. The prolific tendencies shown by the deep sand and the relatively large number of wells within a few hundred feet of completion undoubtedly will result in the establishment of a new peak in this area. It is rather hazardous to venture a guess one way or the other in view of past performances of this extremely erratic district, but do not be surprised if the daily production approaches the 100,000-bbl. mark within the next 30 days. As has been stated on numerous occasions during the past several weeks, it all depends on the rapidity with which these deepening projects are carried to completion. So much for Seal Beach. Now let us look at the rest of the picture, for it is very interesting and fraught with possibilities.

The violent fluctuations in state production during the past year have led many to believe that the worst is over, but do not be misled by these temporary breathing spells, for there is still a lot of oil in "them thar hills," as one grizzled prospector unburdened himself to another veteran wildcatter. It is probably true that the outlook for the coming year does not look as threatening as some other conditions which have existed in the past, but, nevertheless, there are several possibilities for increased production during the coming 12 months. The Seacliff district in Ventura County can be eliminated from consideration for the present, as it may take operators several months to thoroughly test out that section. Exceptional indications as revealed by core samples and subsequent tests, however, tend to show that this district may break forth at any time, although the outlook for big production is not any too bright, as the acreage is all held in large blocks, thus eliminating the necessity of intensive drilling and unnecessary offsetting. The biggest threat from a production standpoint comes from Kern County, where operators and wildcatters have literally gone wild over the prospect of opening up additional fields along a fault line proved possibly productive by the Pacific Eastern's (Gulf interests) Casa Loma test at Bakersfield.

Producing Wildcat

Some incline to underrate this wildcat of the Pacific Eastern, but Hoyt Gale, the locater, has advised the writer that it has exceptional possibilities and that his company expects to secure commercial production at this point. All indications point to the fact that the well in question probably is located some distance from the apex of the structure. This brings up the question as to where the crest of this possible new field is located, as the Casa Loma subdivided area adjacent may come into the play and upset the well known popcorn stand. It is strictly a guessing game up to the present time, but nevertheless this section and other nearby districts now being prospected are all marked as potential fields with more than an even chance of being successful.

The Potrero area, which lies midway between the Rosecrans and Inglewood fields, also may show production within the next few months, as the Associated logged a promising oil sand last November at 4,450 feet. The hole is now being given a production test after a long suspension interrupted only by periodical inspections and the possibility of a new field being opened up at this point is exceptionally bright. An analysis of production figures for the month of July does not reveal any great chance for an early decline, as there are only two fields which can be expected to offer any relief. Those are Huntington Beach and Seal Beach. The former has been slowly declining since the first of this year, but even though it continues to settle from month to month, no substantial relief can be expected to come from this source, as the production curve already has flattened out. There is considerable room for a large drop at Seal Beach, but this area is climbing at present and may reach 100,000 bbls. a day before hitting the toboggan. Ventura Avenue, on the other hand, should continue to produce in excess of 50,000 bbls. a day for the next six months at least, as the amount of drilling already under way is bound to prevent any appreciable drop. Early this year the writer predicted that State production could not be expected to pass below the 600,000-bbl. mark during 1927, and right now it looks like California will continue to yield around this figure for another six months at least. It is absolutely impossible to predict more than six months ahead, due to changing conditions. One thing is certain, however, and that is there will not be any shortage of crude in California for some time. The output probably will go up and down from time to time and tanker movements may fluctuate accordingly. Known deep sands and undrilled proven acreage within the state should prove ample to meet the normal requirements of the West Coast for 10 years. In addition to these absolutely proven sands there are unquestionably a number of new fields awaiting discovery, some of which may be opened up within the next 12 months.

Seal Beach

There were several good wells put on production at Seal Beach during the current week and, judging by the present status of work, 10 additional wells should be finished during the coming seven-day

TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS

Commodity—	Total This week	Daily Average	Total Last week	Daily Average	This year to date	Same time last year
Crude oil	156,429	22,347	292,688	41,813	7,262,595	9,031,413
Fuel oil	100,808	14,401	71,520	10,217	5,521,445	4,817,526
Diesel and gas oil	233,221	33,317	74,568	10,653	2,235,290	2,124,943
Gasoline	250,533	35,790	296,700	42,386	6,288,356	5,075,072
Tops	.....	.....	.....	.....	.....	149,906
Coastwise—						
Crude oil	.....	.....	668,098	95,443	17,929,591	17,009,797
Fuel oil	469,368	67,053	237,714	33,959	8,931,404	7,599,372
Diesel and gas oil	82,952	11,850	.....	.....	358,609	154,368
Gasoline	.....	.....	81,581	11,654	6,376,187	5,392,541
Kerosene	.....	.....	.....	.....	137,475	171,529
Tops	.....	.....	.....	.....	104,595	476,912
Exports—						
Crude oil	586,222	83,746	71,579	10,226	2,360,304	3,092,558
Fuel oil	182,253	26,036	582,531	83,219	19,061,128	12,493,974
Diesel and gas oil	3,579	511	59,185	8,455	904,851	274,767
Gasoline	192,218	27,603	72,696	10,385	3,182,593	3,178,565
Tops	45,920	6,560	.....	.....	273,124	96,552
Kerosene	.....	.....	72,350	10,334	1,551,344	1,943,364

TANKER SHIPMENTS FROM SAN FRANCISCO TO ATLANTIC, GULF COAST PORTS

Fuel oil	.....	.....	.....	.....	.....	78,653
Diesel and gas oil	.....	.....	.....	.....	505,608	1,231,977
Gasoline	77,629	11,089	.....	.....	1,496,334	774,976
Tops	.....	.....	.....	.....	.....	73,698
Lubricants	.....	.....	.....	.....	303,016	215,617
Coastwise—						
Fuel oil	7,915	1,131	.....	.....	3,849,025	3,645,725
Diesel and gas oil	.....	.....	.....	.....	267,012	.....
Gasoline	114,972	16,425	83,593	11,942	3,633,296	3,278,044
Kerosene	.....	.....	.....	.....	151,972	268,433
Exports—						
Fuel oil	.....	.....	116,444	16,635	2,058,071	2,751,775
Gasoline	83,500	11,929	55,609	7,944	2,229,229	1,453,841
Kerosene	.....	.....	25,451	3,636	592,987	1,462,297
Lubricants	.....	.....	.....	.....	18,370	26,810

IMPORTANT SOUTHERN CALIFORNIA WILDCATS

Company, Well, Location—	S-T-R	Depth	Status
Calif. Eastern, No. 1 Cypress, Potrero	27- 3-14	5,043	suspended
Associated, No. 1 Cypress, Potrero	34- 2-14	4,450	testing
Mont. Park Oil Co., No. 1 Browning, Mont. Park	26- 1-12	2,003	sd. drilling
Circle Oil Co., No. 1 Pomeroy, Manchester	23- 3-14	4,280	suspended
Shell, No. 1 Mission, San Fernando	4- 2-15	3,691	fishing
Sou. Calif. Drlg. Co., No. 1 Matteson, El Segundo	1- 3-15	1,870	plug back
Carr, O. P., No. 2 Foster, San Juan Capistrano	13- 8- 8	3,560	h't. sd. drilling
Thomason & McCoy, No. 1 Rinz, Saugus	27- 5-16	1,610	suspended
Southwest Pet., No. 1 Ramsauer, Wat s	4- 3-13	3,200	hd. sd. drilling
San Clemente Oil Co., No. 1 Peck, Hawthorne	20- 3-14	4,270	sd. sh. drilling
Western Oil & Ref. Co., Well No. 1 Hawthorne	29- 3-14	Rig	suspended
White Behr, No. 1 Watson, L. A. County	21- 4-14	Rig	rigging up
Shell, No. 1 Allec, Placentia	31- 3- 9	3,281	sd. sh. drilling
Standard, No. 1 Olive, Orange Co.	17- 4- 9	3,301	hd. sd. drilling
Son. C. A., No. 1 Pinkerton, Orange Co.	5- 5-11	1,691	gr. sd. drilling
Standard, No. 1 Rndge, Palms	36- 1-15	Rig	in litigation
Hemet Pe . Co., No. 1 Ward, Riverside Co.	9- 5- 1	1,330	hd. sd. drilling
Anchor Oil Co., No. 1 Hudson, Los Angeles Co.	19- 2-10	700	fishing

IMPORTANT NORTHERN CALIFORNIA WILDCATS

Associated, No. 1 Smith, Kettleman Hills	12-23-18	2,043	suspended
Bolsa Chica, Well No. 1 Kettleman Hills	30-23-19	3,341	sd. sh. drilling
General Pet., No. 1 Burbank, Kettleman Hills	30-23-19	3,105	pipe bad
General Pet., No. 2 Oschener, Kettleman Hills	26-22-18	4,445	gr. sd. drilling
General Pet., No. 1 Dome, Kettleman Hills	4-24-19	3,510	gr. sd. drilling
C. C. M. O., No. 1 McGlashan, Kettleman Hills	17-24-19	4,860	fishing
Sou h Coalinga, Well No. 1, Kettleman Hills	35-24-19	2,800	sd. sh. drilling
McPhail, Hugh, Well No. 1 Kettleman Hills	13-24-18	2,071	suspended
Superior Oil Co., Well No. 1, Kettleman Hills	26-21-17	710	sd. drilling
Milham Explin., No. 1 Kettleman, Kings Co.	2-22-17	3,598	cleaning out
Shell, No. 2 Berlywood, Moorpark	32- 3-20	4 0	hd. sd. drilling
C. C. M. O., No. 1 Hobson, Ventura Co.	22- 3-24	6,600	br. sh. drilling
C. C. M. O., No. 1-B Hobson, Ventura Co.	16- 3-24	5,020	br. sh. drilling
Pan American, No. 1 State, Ventura Co.	17- 3-24	2,191	sd. sh. drilling
Pan American, No. 1 U. S., Ventura Co.	17- 3-24	Rig	suspended
Scott Petroleum, No. 1 Surf, Ventura Co.	35- 4-24	500	suspended
Continen al Oil Co., No. 1 Burnham, Ventura Co.	22- 5-18	3,050	reaming
Standard, No. 1 Camarillo, Ventura Co.	29- 2-20	5,588	hd. sd. drilling
Standard, No. 1 Montalvo, Ventura Co.	17- 2-22	6,799	abandoned
Petroleum Sec., No. 1 Diablo, Ventura Co.	26- 5-18	2,950	gr. sd. drilling
Parkford, E. A., No. 1 Strathern, Ventura Co.	5- 2-18	3,600	suspended
Star Petroleum, No. 1 Canet, Ventura Co.	13- 3-23	5,240	fishing
Richfield, No. 27 Piru, Ventura Co.	35- 5-18	1,902	suspended
Milham Explin., No. 2 But onwillow, Kern Co.	8-28-23	4,662	gas well
Milham Explin., No. 3 Buttonwillow, Kern Co.	7-29-24	4,055	testing
Pacific Eastern, No. 1 Bakersfield, Kern Co.	6-30-28	4,392	prod. test
General Pet., No. 1 Edison, Kern Co.	5-30-29	1,414	hd. sd. drilling
Shell, No. 1 Mon Bluff, Kern Co.	3-28-28	790	sd. drilling
Kerwin & Seal, No. 1 Edison, Kern Co.	4-30-29	Rig	rigging up
Getty, George F., No. 1 Edison, Kern Co.	22-29-29	1,160	sd. drilling
Mays & Valencia, No. 1 Machado, Kern Co.	31-30-28	Rig	rigging up
C. C. M. O., No. 1 Quinn, Delano	23-25-27	2,281	plug back
North American, No. 1 Wallace, Delano	5-25-26	151	sd. drilling
Sayers, R. H., No. 1 Poso, Kern Co.	7-26-18	Mtl.	building rig
Richfield, No. 1 Wreden, San Luis Obispo Co.	10-29-17	721	cement ed
Shell, No. 1 Cowell, San Mateo Co.	8- 6- 5	4,440	hd. sd. drilling
Shell, No. 1 Ashton Craft, San Mateo Co.	17- 6- 5	2,500	suspended
Shell, No. 1 Murphy, Petaluma	28- 5- 6	6,360	hd. sd. drilling
Shell, No. 2 Murphy, Petaluma	8- 5- 6	1,092	sd. drilling
Thomas & Hammill, Well No. 1, Alameda Co.	16- 3- 3	1,250	hd. sd. drilling
Elliott & Clarke, No. 1 Marcos, San a Barbara Co.	3- 6-29	1,915	h't. sd. drilling
Becker, G. F., No. 1 Summerland, Santa Barbara	33- 4-25	3 080	set pipe
Birch Oil Co., No. 1 Porterville, Tulare Co.	13-20-26	2,000	bl. sh. drilling
Union Oil Co., No. 1 Huasna, San Luis Obispo	26-32-15	.....	location

period. George F. Getty topped the weekly completion list by bringing in three wells, all of which were recompletions after being redrilled and deepened from the upper to the lower sand. The largest of this trio was No. 5 Alamitos, which was returned to production flowing 2,320 bbls. of clean 29.6 gravity oil daily from 5,226 feet. No. 3 Alamitos came in under a natural flow doing 1,198 bbls. of clean 29.4 gravity oil and 7,000,000 feet of wet gas daily from 5,250 feet. No. 7 Alamitos registered an initial of 1,260 bbls. and 8 000 000 feet of gas daily from the 5,300-foot level. George F. Getty is deepening six other wells in this field, two of which should be recompleted within the next 14 days. Paul Getty, who recompleted No. 2 fee last week, flowing 3,210 bbls. daily from 5,314 feet, added another producing well to his string by redrilling and deepening No. 2 Cleaver from 4,852 feet to 5,255 feet, from which depth it was returned to production making 2,900 bbls. of exceptionally clean 29.7 gravity oil daily.

No. 3 Naples, of the Petroleum Securities, was the largest producer finished during the week and it is incidentally the largest flowing well in the Seal Beach Field at the present time. This well, which is a recompletion after being deepened to the lower sand, tanked 3,750 bbls. of clean 29.8 gravity oil daily. The company is withholding the completion depth and while it is reliably reported to have been brought in from 5,325 feet this could not be confirmed, due to the policy of withholding information which might prove detrimental to the best interests of the company. The Pan American and Petroleum Securities, which are working on a 50-50 basis at Seal Beach, have 11 deepening projects in the town-lot area within 200 feet of completion and these two Doheny companies should, therefore, show a substantial increase in daily production within the next two weeks. In addition to No. 3 Naples, the Petroleum Securities brought in No. 7, a recompletion on the same lease flowing 2,475 bbls. of 29.5 gravity oil daily from approximately 5,250 feet and followed this with another deepened project, No. 1 Williams, which was returned to production flowing 2,780 bbls. of clean 29.3 gravity oil daily.

Several upper-zone producers went off production during the past week, due to depletion of the Selover zone and deepening work was immediately started in order that production in the lower flush horizon might be secured as soon as possible. No. 1 Fueller, of the California Eastern Oil Co., which came in several weeks ago flowing 2,260 bbls. a day from 4,910 feet, died a natural death and it is already on the way down to the Wahl sand. This company also is working on six other holes whose final objective will be the lower horizon. The Cal-American Oil Co. has taken its No. 1 Alamitos off production in order to participate in the lower flush production, but with about 400 feet of hole to make it probably will not be recompleted for another two or three weeks. No 1. McMasters, of the California Petroleum Corp., did not hold up from the 4,915-foot level and it has accordingly been taken off production for deepening. This company's next producer in the town-lot area probably will be No. 1 Alamitos, which is showing exceptional promise in the deep sand. The Marland recompleted No. 13 Selover this week, carrying it down from 4,960 feet to 5,280 feet, from which depth it came in flowing 3,500 bbls. of exceptionally clean 29.1 gravity oil daily. The company has three other potential producers nearing completion in the northern part of the Selover property, the trio of wells in question being direct offsets to the town-lot area. The Universal Consolidated recompleted No. 1 Wolf a few days ago after redrilling and deepening it from 4,785 feet to 5,384 feet, but the company only secured 865 bbls. of clean 28.4 gravity oil daily. It is showing a consistent gas pressure of 700 pounds, however, and hence may hold up better than some of the larger completions.

Long Beach

The Shell finished another large flowing well in the deep sand at Long Beach during the past week, the instrumentality being No. 8 Cresson, which showed an initial of 1,150 bbls. from 5,472 feet. The Shell has two additional potential deep-sand producers on this lease, in addition to No. 13 Alamitos, which at the present time is not looking any too good at 5,660 feet. The California Petroleum's No. 6 Davidson, No. 5 Masser of the California Eastern Oil Co., and No 2, Jackson of the A. T. Jergins Syndicate, are expected in momentarily, the outlook being favorable for good production in the deep sand. The Richfield Oil Co. is well under way with its deep-sand development of the San Martinez and Delaney properties, which it acquired a few weeks ago. It required the combined efforts of the Long Beach and Signal Hill city fire departments to extinguish a gasoline fire which broke out at the loading platform of the McMillan refinery in the center of the field during the early part of the week and it looked for a time as though it might get beyond control. The blazing gasoline flowed down hill toward the main buildings of the refinery, but a hastily constructed trench diverted the fluid and aided the firemen in extinguishing the blaze. A loaded truck, trailer and a 750-gallon gasoline tank were destroyed, however, before the fire was extinguished. Officials of the Bolsa Chica Oil Co. will shortly announce that a new well will be drilled on the Jonah Jones lease in this field with the deep sand as its objective. The company also will carry the Mutual well down to the lower sand.

One of the most important completions in the town-lot section of the Huntington Beach Field during the past week was J. E. Hayden's No. 1 Hecla, which registered an initial of 150 bbls. from 3,872 feet. The importance of this new well lies in the fact that it proves up several adjacent drilling wells and tends to indicate that a part of the present business district at Huntington Beach may be productive. Hayden's completion, which is located near Eighth and Ocean Avenue, offsets the Loftin Oil Co.'s No. 2 Huntington, which is located in the rear of the Huntington Inn, one of the best hotels at Huntington Beach. The latter was reported down 2,700 feet a few days ago, but is expected to be completed within the next three weeks. Gene Hall's No. 3 Maran, which come in two weeks ago flowing 1,192 bbls. from 3,855 feet, is holding up remarkably well, the present production being approximately 750 bbls. In the older section of the Huntington Beach Field the Standard finished No. 30 Bolsa Chica, a new well at 3,590 feet. It was somewhat of a disappointment, however, as the initial 24-hour test showed 85 bbls. of clean 27.5 gravity oil and a little better than 5,000,000 feet of wet gas. As a result of the failure of operators in the Huntington Beach Field to watch their step following a general warning to take immediate steps to prevent further pollution of Southern California beaches, the California Fish and Game Commission filed suit a few days ago against 56 operators and Attorney General Webb contemplates severe action, not only at Huntington Beach, but in other areas as well. Federal authorities also have entered the picture and a very determined attempt will be made to abate pollution of public beaches which, during the past year, has become more than a nuisance. The coast guard and rum-chaser fleet, while not pursuing other duties, will be used to secure evidence against tankers and other vessels emptying oil bilge off shore.

Richfield-Brea Olinda

The Standard Oil Co. successfully completed No. 1 Son-Crail in the Richfield district during the early part of the week and incidentally extended the proven limits about 700 feet south. The company's new well, which was drilled to 3,118 feet and finished with a 9-inch oil string carrying 200 feet of 100-mesh screen, registered an initial of 180 bbls. daily, the oil testing 18.1 degrees. Simultaneously with this completion the Standard spudded in No. 2 Moll and started rig construction for No. 1 Son-Crail-Yorba. General Petroleum also finished a new well in this field during the past week, the company's successful completion being No. 2 Pedeco, a 250-bbl. pumper from 4,705 feet, the hole being finished with a 5¾-inch oil string carrying 560 feet of shop perforated. The Union Oil Co., discoverer of the Richfield district and one of the most aggressive operators in that area, is running six strings of tools at the present time. The company's next producer in this section probably will be No. 10 Stern, which is at present rotating ahead in the oil sand. In the Coyote Field the Herndon Petroleum recompleted Nos. 1 and 2 on the Lemke lease and the company's present production approximates 400 bbls. daily. This should be increased within the next 60 to 90 days, however, as two new wells, No. 3 Lemke and No. 1 Queyrel, are scheduled to be spudded in within the next few days and carried to completion as soon as possible. No. 1 Barnett of the Holly Development Co. showing up as well as anticipated and at 3,830 feet the outlook is not any too promising. The Shell's deep test in the Brea Olinda Field, No. 40 Columbia, is rotating ahead in a hard sandy shale at 6,830 feet, there being no important showings logged up to the present time. The company's No. 2-A Puente, another deep test, however, cored a rather promising sand at 5,510 feet, which reacted favorably to the other test, the cut being very perceptible.

Ventura

With production restrictions lifted in the Ventura Avenue Field, operators are again resuming an aggressive drilling campaign, and this new work practically precludes any decline in field production for some time. The Shell recently spudded in two new wells and is now running 10 strings of tools which will be increased a little later as three additional rigs are in course of construction at the present time. The Associated likewise spudded in two additional holes during the past two weeks and some little additional work can be anticipated from this source during the next several weeks. The Associated has two new wells scheduled for completion in the near future and both, No. 3 Hartman and No. 50 Lloyd, should be tanking oil within the next 15 days. No. 1 Dabney Lloyd also looks good, although it will probably be three weeks before a production test is completed. No. 41 Lloyd, which this company brought in last week doing 2,605 bbls. daily, is holding up exceptionally well, the present production being approximately 2,500 bbls. of oil and 3,000,000 feet of gas daily. The General Petroleum, like the Shell and Associated, is broadening the scope of its drilling activities by starting two new holes. The Petroleum Securities, operating exclusively in the extreme southern part of the field, is running six strings of tools on the Willett and Orton leases and No. 2 Willett and Nos. 2 and 3 on the Orton property should be on production within the next 30 days. The Bolsa Chica will soon have two wells under way in Ventura County if present plans are carried out, as a new wildcat is contemplated for the Temescal anticline at Piru. In the Ventura Avenue Field the company's No. 3 Hartman is passing through an extremely hard formation at 4,580 feet and rock bits are being ground up as fast as they can be run in.

Goleta

The Goleta Field in Santa Barbara County, which up to a short time ago showed evidences of sustaining good production, has proved a terrible bust, in fact, one can hardly reconcile present production with that of 60 days ago. The Miley Oil Co., discoverer of this district, appears to have been especially hit hard, as its daily average well production has declined to almost 15 bbls. The Transcontinental Oil Co. has not yet been affected except for the normal decline

(Continued on Page 305)

NEW ROYALITE WELL SPUDDED IN; DALHOUSIE NO. 1 RESUMES DRILLING

By Victor Lauriston
Staff Correspondent, Canadian Fields

CHATHAM, Ontario, Sept. 17.—In the Turner Valley field southwest of Calgary, Royalite Oil Co. No. 4 naphtha gusher, LSD 12, Section 7-20-2w5, had a production for August of 16,969 bbls. or 547 bbls. a day, compared with a production in July of 17,-141½ bbls., averaging 553 bbls. a day. Royalite No. 7, LSD 3, Section 13-20-3w5, is drilling at 4,100 feet and has not yet reached the Madison limestone. Royalite No. 8, LSD 9, Section 11-20-3w5, is at 706 feet and drilling. Royalite No. 9, LSD 6, Section 13-20-3w5, supdded in on September 12.

Dalhousie Oil Co. No. 1, formerly Southern Alberta No. 1, LSD 4, Section 18-20-2w5, is reported to have resumed drilling after cementing a caving at 4,-211 feet. At this depth a gas flow was encountered in the Madison. The heavy pressure of mud and water used in drilling is keeping back the gas, so that the exact extent of the flow cannot be determined. The drill is thought to be near the Royalite production horizon. Dalhousie No. 5, LSD 16, Section 30-19-2w5, is running tubing preparatory to a production test of the oil horizon encountered in the quartzite shale at 4,-549 feet. A line has been laid to the Royalite plant and a 10,000 bbl. tank erected to handle the production, estimated between 250 and 400 bbls. a day. The crude will be "batched" through the Royalite naphtha line to the Imperial Oil, Ltd.'s refinery at Calgary. Dalhousie No. 6 LSD 10, Section 13-20-3w5, is at 4,370 feet and drilling.

Foothills Oil & Gas Co. No. 1 (Imperial-Millarville) SW, Section 26-20-3w5, is at 1,910 feet and drilling.

McLeod Oil Co. No. 1, LSD 16, Section 1-20-3w5, which recently started making new hole at 2,400 feet, is reported drilling at 2,405 feet. The test will be carried to the producing horizon in the Madison limestone. Some underreaming has been done to enable the drillers to lower the 8¼-inch casing as the drilling proceeds.

Stockmen Oils No. 1, LSD 1-2, Section 27-20-3w5, is drilling through the cement plug put in at 4,100 feet to wall-off a bailer. The original hole is at 5,-300 feet.

Illinois-Alberta Oil & Refining Co. No. 2, LSD 14, Section 12-20-3w5, has finished hauling equipment and is practically ready to spud in.

Resumed Drilling

Okalta Oils No. 1, LSD 1, Section 1-20-3w5, has resumed drilling after setting the 10-inch casing at 3,800 feet. Calmont Oils, LSD 2, Section 1-20-3w5, at 4,102 feet is drilling through 60 feet of cement put in to straighten the hole.

Spooner Oils No. 1, LSD 12, Section 13-20-3w5, is at 4,612 feet and in the top of the Madison limestone. The 6¾-inch casing is being hauled and will be cemented in the top of the limestone before drilling the well down to production. Vulcan Oils No. 2, LSD 11, Section 13-20-3w5, is drilling at 3,450 feet and more than 200 feet in the Kootenay formation.

Dolomite Oils, LSD 3, Section 1-20-3w5, is reported drilling below 1,750 feet. British Dominion Oil Corp. LSD 4, Section 5-20-2w5, is working on casing at 5,990 feet. New McDougal-Segur No. 2, LSD 14, Section 12-20-3w5, is at 2,-224 feet and drilling. New Valley Oil Co., LSD 4, Section 6-21-2w5, is drilling at 2,050 feet. Regent Oil Co., LSD 16, Section 1-20-3w5, is at 2,710 feet and underreaming.

Southern Foothill's

In the southern foothills, Imperial Oil, Ltd. Highwood No. 1, LSD 3, Section 36-18-3w5, is reported drilling at 3,255

(Continued on Page 305)

PROGRESS!

For more than 15 years WICO has been furnishing MAGNETOS for OIL FIELD use

FOR more than fifteen years Wico has been furnishing magnetos for oil field use.

Their continuous untiring performance under the grind of oil field conditions has helped establish new records for oil production.

Yet Wico has moved on to new accomplishments. Now the Wico magneto is improved to where it can be mounted on the engine, correctly timed and *forgotten.* It needs *no oiling or adjustment.*

Study and investigation by Wico engineers—plus the suggestions and advice of our oil field friends has made this progress possible.

WE take this opportunity to thank those whose friendly counsel has contributed so largely to our success.

Our Tulsa branch will be open for inspection during the week of the Exposition. You are urged to visit us.

Factory Branch: 121 West 8th Street, Tulsa, Oklahoma

WICO ELECTRIC COMPANY, SPRINGFIELD, MASS.

Wildcat Producer in Auglaize County

Roundhead Field in Hardin County, Ohio. Two Tests in Allen County Likely to Encourage Development

By Whit
Staff Correspondent, Central West Fields

FINDLAY, Ohio, Sept. 19.—There was a scarcity of features in any division of the Central West Field for the week in review. The Lima division took the lead in the number of completions, followed by Indiana, Illinois and central Ohio, there being 28 completions in the four divisions, 17 of which were producers with an initial production of 243 bbls., 5 dry holes and 6 gas wells. The most important of these new completions was a wildcat on the Charles Campbell farm, in Wayne Township, Auglaize County, in the extreme eastern part of the county, near the Roundhead Field of Hardin County. This well for the first 24 hours pumped 11 bbls. Another well of interest was a test on the John M. Miller farm, Section 11, Bath Township, Allen County, with an initial production of 35 bbls., and another test on the W. B. Hall farm, Section 13, same township, for 20 bbls. These two wells will bring about more development in that area that for years was considered of little value for production. Two test wells in Center Township, Mercer County, on the Riley lease in Section 27 and the other on the Sealscott lease, Section 22, will help along materially in furnishing more gas for citizens of Celina.

Indiana failed to show anything out of the ordinary, although in the extreme southern part of the State near New Albany, in Harrison County, two gas wells were reported by the Louisville Gas & Electric Co.

The feature of the Illinois Field was the bringing in of a 1,500,000-foot gas well on the Madden lease in Wabash Township, Wabash County, from the shallow Bridgeport sand at 1,040 feet. Central Ohio was featureless.

Lima Field

Seventeen completions were reported from the old Lima Field of northwestern Ohio, indicating that the contractors have been busy the past few days and are making arrangements to move to new locations. A little wildcatting is being done in various counties, but not far removed from older production. The operator is in this manner feeling the way for new extensions to the already large continuous producing area of the State.

Approximately 6 miles northeast of Lima, H. F. Kelly and others' test, in the northeast corner of the John M. Miller farm, in the southeast quarter of Section 11, Bath Township, Allen County, topped the Trenton formation at 1,321 feet, drilled 41 feet in the sand, was given a shot and put on the pump, showing an initial 24 hours' gauge of 35 bbls. It is a slight extension to the old producing area. In the same township, the Carman Oil Co.'s test, 250 feet from the north line and 1,200 feet from the east line of the William B. Hall farm, in the southeast quarter of Section 13, found top of sand at 1,365 feet and went 53 feet in the sand, getting a 20-bbl. initial pumper. This well is a little over a mile to the southeast of the new well on the John M. Miller farm, and about a mile south of the good production in Section 12, same township, known as the Driver Pool. C. M. Peavey is drilling No. 4 on the C. M. Lenney farm, Section 1, same township, and north of the Driver Pool. W. W. Botz and others are drilling a test on the Charles E. Landis farm, Section 14, same township. With an advance in the price of crude this part of Bath Township will get a nice drilling play, as late completions have been above the average producers for the Trenton Rock Field.

Auglaize County

Cook and others drilled a test in the northeast corner of the F. Wierwille 80 acres, in the east half of the northeast quarter of Section 9, Washington Township, Auglaize County, about 5 miles directly east of St. Marys; 2 miles east and 3 miles north of New Knoxville and 4½ miles south and 2 miles east of Glynwood. Sand was struck at 1,192 feet and drilled 20 feet in where water was encountered and it goes down as a dry hole. This dry hole is south and east of old defined lines of production.

In Wayne Township, in the far eastern part of the county and up near the Hardin County line, not far from the Roundhead Field of the last-named county, Arthur & Simpson drilled a wildcat 480 feet from the north line and 950 feet from the west line of the Charles Campbell farm, getting an 11-bbl. initial pumper. Top of Trenton was found at 1,452 feet and drilled 48 feet in the sand to a total depth of 1,500 feet. Arthur & Simpson have been doing a large amount of drilling for gas in the Cleveland Field of Cuyahoga County and drilled the wildcat as an experiment. It may mean the opening of another pool. Abbott Brothers are drilling a test in the same township on the Harrison Goddard farm.

The Bachelor Oil Co.'s No. 13 well, 240 feet from the north line and 300 feet from the west line of the William T. Seibert farm, in the southeast quarter of Section 3, Salem Township, about 3 miles southwest of Kossuth and about 6 miles north of St. Marys, struck top of Trenton at 1,144 feet and went 40 feet in the sand where the first 24-hour production amounted to 25 bbls. Stelzer & Boyd's No. 6 well, 300 feet from the north line and 900 feet from the west line of the A. J. Gierhart farm, in the southwest quarter of Section 5, same township, and about 2¼ miles west of the Seibert farm well, topped the sand at 1,135 feet and at 51 feet in the sand showed an initial production of 8 bbls.

Southwest about a mile from the Seibert farm well the Petroleum Producing Co., formerly reported as George S. Lackenett and others, drilled in a second test in the northwest corner of the Joseph Mallory farm, in the northeast quarter of Section 9, Noble Township, getting a 25-bbl. initial producer. Sand was topped at 1,132 feet and was drilled 40 feet in the sand.

Mercer County

In Center Township, Mercer County, the Celina Oil & Gas Co.'s test in the northwest corner of the Pat Riley farm, in the northeast quarter of Section 27, struck top of Trenton at 1,125 feet and at 20 feet in got a nice gas volume, which was connected at once to the line furnishing natural gas for Celina. The second well was drilled 750 feet from the north line and 250 feet from the west line of the same farm, the sand also being found at 1,125 feet and drilled to a total depth of 1,155 feet, and was a dry hole. The dry hole came as quite a surprise, being but 500 feet south of No. 1 and the sand being found at the same depth, without any showing of gas or oil. Same company's No. 1 in the southwest corner of the H. Sielschott farm, in the southeast quarter of Section 22, same township, found top of sand at 1,125 feet and gas at 1,157 feet and connected to the Celina gas line.

Lonien & Manion's test in the northwest corner of the Wesley Copeland farm, in the southeast quarter of Section 27, Center Township, topped Trenton at 1,146 feet and went 40 feet in the sand, the well having an initial production of 4 bbls. of oil.

Scattered Wells

In the Colt Pool, Perrysburg Township, Wood County, the Oko Oil & Gas Co., of Lima, brought in No. 14 well, 1,450 feet from the east line and 690 feet from the south line of the George Deverna farm, in the southeast quarter of Section 29, for a 10-bbl. pumper. Top of sand found at 1,245 feet and oil at 40 feet in the sand. In the same township, George L. Haubert and others' No. 3 well, 870 feet from the south line and 200 feet from the east line of the same section, struck top of sand at 1,238 feet and at 42 feet in the sand pumped an initial of 3 bbls.

A little over a mile west of West Millgrove, in the northwest corner of Perry Township, Wood County, W. H. Dennis and others' No. 5 well, 450 feet from the north line, 150 feet from the east line and 800 feet from the west line of the Bressler Brothers farm, in the southwest quarter of Section 6, went to a total depth of 1,210 feet, with no oil showing, although there was a slight showing of gas.

In the McComb Field, in Pleasants Township, Hancock County, and a mile or so north of McComb, McClure and Schrack's No. 4 well, 630 feet from the north line and 440 feet from the east line of the Sarah Rader farm, in the northwest quarter of Section 14, struck top of Trenton at 1,380 feet and at 30 feet in the sand, at a total depth of 1,410 feet, produced 45 bbls. under pump in 24 hours, which is an exceptionally good well for these days in the Trenton sand. In the same township, the Bath Township Oil Co.'s No. 6 well, 200 feet from the north line and 660 feet from the west line of the John A. Bryan farm, in the southeast quarter of the same section, struck top of sand at 1,384 feet and at 40 feet in the sand pumped 15 bbls. initial the first 24 hours under pump.

Shelby County

In Cynthian Township, Shelby County, after a long and tedious drilling job, the Eilerman Oil Co. has at last brought in its No. 3 well, 200 feet from the north line and 700 feet from the south line of the N. A. Paulus farm, in the southwest quarter of Section 35, for a 10-bbl. pumper. Sand was struck at 1,230 feet and sent to a total depth of 1,280 feet, or 50 feet in the sand.

A report from the well recently drilled by John Whitmore and others 2,000 feet from the north line and 200 feet from the west line of the Dayton Connor farm, on the oil map as the J. Martin farm, in the southeast quarter of Section 21, Liberty Township, Seneca County, and about one-half mile east of No. 2 on the Bunker farm, drilled by Murphy and Son some months ago, is said to have produced but 1 bbl. after being shot, the first 24 hours. Top of sand in this well was found at 1,373 feet and went to a total depth of 1,598 feet, or 225 feet in the sand. This well is the second out of 10 trys in this area that showed any oil, the other eight being dry holes.

Indiana

Only three completions are reported from the Indiana Field since the last report and two of them were dusters, the

(Continued on Page 309)

NEW PRODUCER ADDS TERRITORY SOUTHEAST OF THE AMBROSE POOL

By Whit
Staff Correspondent, Kentucky-Tennessee

BOWLING GREEN, Ky., Sept. 17.—Only eight completions were recorded from the Kentucky fields, and none from Tennessee. The most important of the late completions in the Blue Grass state was made by Taylor Yewell and others on the Bob Hamilton farm, on the banks of Rough River, east of Taffey, and some few miles southeast of the Ambrose Pool. It indicates that a nice strip of acreage looks like an interesting development. This well was drilled in and given a shot and has been flowing its oil into tankage, but will not be put on the pump until pipe line connections are made, it being some distance in advance of the pipe line. This adds considerable acreage to the oil producing area of Ohio County which for several months has been the backbone of Kentucky's oil development. The well is estimated above 50 bbls. In the Ambrose Pool, also in Ohio County, a 200-bbl. initial producer was found at No. 8 on the Fannie Lake farm and a 75-bbl. producer on the Frank E. Coomes lease, in the Roby Pool, of Daviess County. The test on the Mt. Moriah Church lot in advance of the Ambrose Pool, also looks like a good strike and should produce at least 50 bbls. when put on the pump.

Drilling Crew Scorched

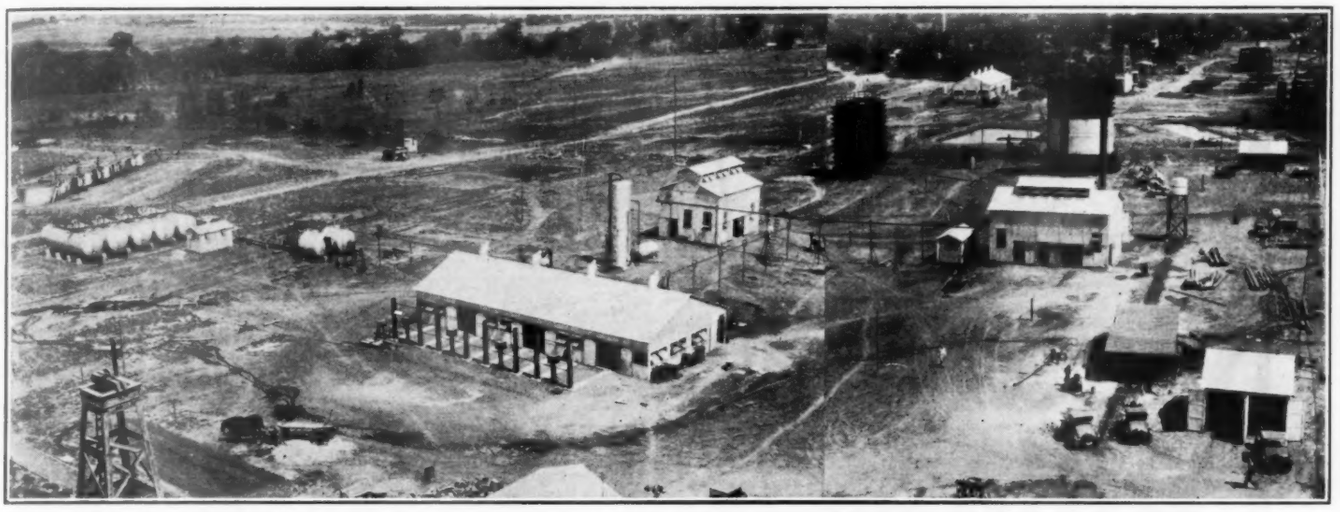
Two drillers and two tool dressers working for the Mid-Southern Oil Co., on the General Wood 2,700 acre ranch, 13 miles northeast of Scottsville, in the northeast corner of Allen County, in what is known as the "Horseshoe Bend" of Barren River were badly burned when a pocket of gas they had struck in well No. 15 on the lease caught fire. When the gas pocket was struck, a fire that had been used in dressing a bit was extinguished but the gas caught from the red hot metal. All four men burned lived on the lease. They were Oscar Stafford, Vertel Stafford, Benton Shelton and Francis Tucker. Although the men's injuries are painful it is not thought any of them is seriously injured. They were taken to the Scottsville Hospital for treatment. Tucker who was the most seriously burned had just put on a dry shirt a few minutes before the fire started and the shirt caught fire and his back was burned. Quick work on the part of workers on the lease saved the drilling machine. The guy wires of the rig were cut and the machine moved back before it was seriously damaged. It had already caught fire but the blaze was easily extinguished.

The well is the fifteenth on the General Wood's lease that has been put down by the Mid-Southern Oil Co. It is about 225 feet deep. This lease has attracted considerable attention in oil circles this summer, some very good wells having been brought in on the big acreage.

Glycerin Lets Go

Bowling Greenites were awakened at 3:45 o'clock a few mornings ago when a tremendous blast rocked the city like an earthquake. Something like 200 quarts of nitroglycerin in a steel magazine owned by the Eastern Torpedo Co., on the Henry Brite farm, near Bur on Memorial Church in Warren County, let go, tearing a tremendous hole in the side of a bluff and ripping a hole some 4 to 6 feet into the

(Continued on Page 324)



STEFCO Housed Gasoline Plant, Seminole, Okla.: Nine Buildings—Nine Different Uses—All STEFCO

The Oil Industry's Most Popular Building

That STEFCO buildings are popular with the Oil Fraternity is evidenced by the fact that practically wherever oil is produced you will find them in use for every purpose. There are many reasons for this popularity—they are neat appearing, well flashed, designed according to the best engineering practice and standardized in seven general types. STEFCO buildings are particularly adapted to meet the Oil Industry's requirements and are 100% salvable.

STEFCO SERVICE Is As Favorably Known As the Product Itself

Competent Engineers at your service to assist you in solving your building problems. Factory Facilities devoted entirely to the manufacture of one product—Steel Buildings. We are the largest exclusive fabricators of Standardized Steel Buildings in the world, insuring you against "fly by night fabricators." Prompt shipments place your building on the site before the foundation is finished. To complete Stefco Service expert erection crews are maintained in all major fields.

STEFCO Buildings and Service Will Please You

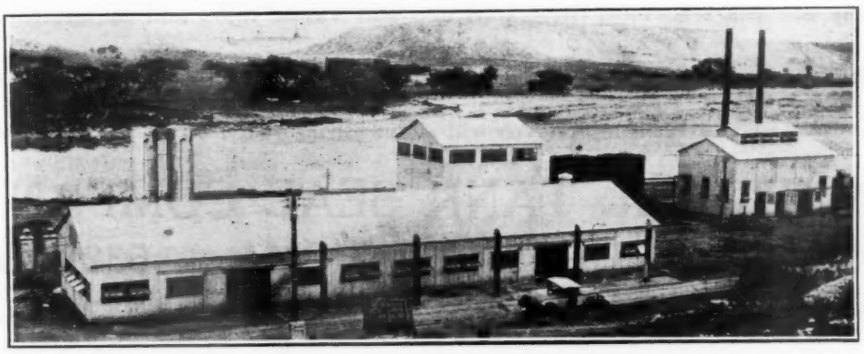
BRANCH OFFICES
IN ALL
PRINCIPAL CITIES

STEFCO STEEL COMPANY
MANUFACTURERS OF
GENERAL OFFICES AND WORKS — MICHIGAN CITY INDIANA U.S.A.
STEFCO
READYBUILT STEEL BUILDINGS

Mid-Continent Office
TULSA, OKLA.

Texas Office
DALLAS

Louisiana-Arkansas
SHREVEPORT



Ralph Baker
Corporation
Natural Gasoline
Plant

Borger, Texas

32'x110'x10'
Compressor Building

26'x28'x24'
Absorption Unit Bldg.

24'x40'x18'
Boiler House

Results that Mean Dollars

SIMMS OIL COMPANY

Dallas, Texas,
October 19th, 1925.

National Tank Seal Company,
Dallas, Texas.

Gentlemen:

In September 1924, we leased three 55,000 barrel storage tanks at the Montrose Refining Company Plant in Fort Worth and placed in these tanks 118,420 barrels of crude which tested 40.3 gravity.

These tanks were numbered 16, 17 and 18, and were regular steel tanks with ordinary wood roofs, sheathed with iron. Numbers 17 and 18 had been equipped in 1918 with your Bonded, Sealed and Vented Roof. No. 16 did not have the equipment.

On September 1st, 1925, we removed the oil from these tanks. The oil in Tank No.16 tested 37.5 while that in Tanks Nos. 17 and 18 tested 39.7.

Congratulating you on the result of these tests, I am

Very truly yours,
SIMMS OIL COMPANY.
BY _____
Superintendent of Pipe Lines.

Saving By Flexible Sealed Top 71%

Ordinary Unsealed Tank

2.8° Baume Gravity Loss 1 yr.

Value of oil lost—$18,925.00

Flexible Sealed Top Tanks

0.6° Baume Gravity Loss 1 yr.

Value of oil lost—$5,265.00

Volume loss estimated by Bureau of Mines formulas. Cash values based on grade prices current during test.

These two Flexible Seal Tops, after seven years previous service, in this instance saved $13,600 each to the owners of the oil stored that year.

Now, after nearly ten years service, these tops are still vapor tight and apparently good for many more years.

Sealing tanks will accomplish the maximum evaporation saving at the minimum expense.

We will be glad to explain how a Flexible Seal Top will aid in solving your particular evaporation or B. S. problem.

NATIONAL TANK SEAL COMPANY

Phone 4-2467 TULSA, OKLAHOMA 532 Robinson Bldg.

Southeast Ohio Completes Good Well

Washington Township, Hocking County, Has Largest Initial Producer in Deep Sand For Several Weeks

By D. S. Wakenight
Staff Correspondent, Eastern Fields

PITTSBURGH, Pa., Sept. 19.—Operations in the southeast Ohio fields during the past week completed a few larger wells than for several weeks. The southwest Pennsylvania and West Virginia fields trailed along, completing only light pumpers, gas wells and dry holes. General conditions are unchanged. Refineries in Pittsburgh and vicinity are taking about the usual amount of crude. Operators are confining their efforts to the old fields and drilling down old wells to a lower formation. There is scarcely a district that has not some work of this kind.

For the time being, operators have given up the effort to find strictly new producing territory. In the entire eastern fields there is not a wildcat drilling or a test drilling for production in a sand deeper than the recognized producing formations. In Union district, Harrison County, West Virginia, the Reserve Gas Co. has gone back to its deep test on the Smith Brothers' farm and is ripping the casing with a view to its recovery. Up to the present it has not met with much success. In the event it succeeds in clearing the hole it will resume drilling to an indefinite depth.

Best Completions for Week

The few good completions during the week are located in the deep sand territory in southeast Ohio. The deep sand territory has for a great many years furnished most of the new production and promises to hold that position for many years, after the market advances to a point where it will justify drilling. The cost to drill to the Clinton sand or Niagara Lime formation, is heavy and a light producer is not a paying investment.

In the southeast quarter of section 1, Washington Township, Hocking County, The Golden Rod Oil Co. and others completed and shot in the Clinton sand No. 3 on the R. Y. Hatsel farm. It produced 125 barrels the first 24 hours. The total depth of the well is 2,955 feet. This is the largest initial production of any well completed in a number of weeks. In section 27, Starr Township, the Kachelmacher estate completed and shot in the same formation a test on the Isaac Mitchell farm, good for 20 barrels a day.

In the northeast quarter of section 19, Reading Township, Perry County, C. C. Hillard & Co. completed and shot in the Clinton sand No. 3 on the Samuel Barnes farm, good for 70 barrels a day. Its total depth is 2,950 feet and the location 600 feet west of No. 2 on the same farm.

Drill Deeper to Oil

In Morris Township, Greene County, the Martin Gas Co. had a gratifying experience when it drilled deeper into the Big Injun sand its old gasser on the Jarrett Fox farm. It was drilled in a gasser three years ago and is now producing between 15 and 20 barrels a day. Operations have fallen off quite a bit in Greene County in the past few weeks. With this county out of the running, southwest Pennsylvania will be very quiet. At present Washington and Allegheny Counties have just a few wells drilling and starting and Beaver County has none. All of these three counties have been so closely drilled over there is no longer room for a new pool of appreciable dimensions.

Late Completions

Just at the close of the week, the southeast Ohio fields came to the front with a fair producer, as usual it is located in deep sand. In the southeast quarter of Section 20, Harrison Township, Perry County, William Cline & Co. completed and shot in the Clinton sand a second test on the Timmins Coal Co.'s property. It produced 80 barrels the first 24 hours after shot.

In the central part of Section 18, Sutton Township, Meigs County, the Brewer Farm Oil Co. completed and shot in the Berea grit No. 3 on the T. & H. Brewer farm, good for 12 bbls. a day.

In the northeast quarter of Section 22, Washington Township, Hocking County, the Ohio Fuel Supply Co. has completed and shot in the Clinton sand a test on the H. W. Rheinscheld farm. It produced 30 bbls. the first 24 hours.

In Section 14, Richland Township, Holmes County, the East Ohio Gas Co. completed in the Clinton sand a test on the J. E. Snyder farm. It is a gasser good for 2,000,000 feet.

Coshocton Wildcat Dry

In Mill Creek Township, Coshocton County, H. H. Church and others have completed through the Berea grit a test on the Henry Drindley farm. It is a duster.

In the northwest quarter of Section 16, Harrison Township, Perry County, David L. Melick, trustee, has completed a test on the G. Wilson farm, dry in the Clinton sand.

In the northeast quarter of Section 18, Washington Township, Hocking County, Sweazy & Co. completed a test on the Eliza Woolever farm. It is a duster at a total depth of 2,900 feet.

In Lot 5, Section 14, Medina County, E. R. Edson, Son & Co. completed No. 26 on the W. P. Wertz farm. It is a light pumper. In the same section and township the same parties have completed a light pumper at No. 28 on the same farm.

Licking County

In Section 21, Franklin Township, Licking County, Ralph Brothers completed in the Berea grit No. 10 on the Boy Scouts property, good for 5 bbls. a day. In Section 10 Wehrle & Co. have a pumper at No. 8 on the Elmer Vance farm. In Section 11, same township, W. W. and A. T. Wehrle have completed in the Berea grit No. 8 on the Charles Smith farm. It is a very light pumper.

In Lawrence Township, Washington County, Section 7, J. O. Herlan and others have started to drill a test on the Torner Jett farm. This location is 1 mile west of production. In the same township, Charles Dailey and others have started to drill a test on the Robert S. Rowland farm, 2,000 feet southeast of production.

Meigs County Duster

In the northwest quarter of Section 25, Sallisbury Township, Meigs County, the Ohio Fuel Supply Co.'s test on the W. E. Peoples farm is a duster in the Berea grit. The well shows a lot of salt water and only a very little oil and gas. It will be abandoned.

In Hanover Township, Licking County, the Hope Construction & Refining Co. has started to drill to the Clinton sand a test on the N. C. Fleming farm. In the west part of Section 31, Sutton Township, Meigs County, Koehler & Miller have started to drill No. 4 on the Dana Handshelt farm.

West Virginia

On Big Fork of Little Sandy Creek, Big Sandy district, Kanawha County, 2,600 feet northwest of the Virginian Gasoline & Oil Co.'s test on the George Rucker farm, the Clendenin Development Co. completed its test on the L. Y. Blackwell farm through the Weir sand. It is a duster in all sands.

In McClelland district, Doddridge County, Godfrey L. Cabot completed a test on the Dora McDonald farm, a gasser in the Gordon sand.

Pleasants County

In Jefferson district, Pleasants County, Dinsmoor & Co.'s test on the Henry Severm farm is good for 3 bbls. a day in the Maxon sand. In Grant district, same county, Doctor Conley has a duster in the Berea grit at a test on the T. J. Hickel farm.

On Willow Island Run, McKim district, the South Penn Oil Co. has moved in a drilling machine to No. 19 on the D. W. and D. O. Reynolds farm. This is an old well that was pulled out and plugged some years ago. It will be drilled deeper.

Clay County

In Henry district, Clay County, the United Fuel Gas Co. has completed No. 4 on the J. M. Gross farm. It is a gasser in the Big Injun sand, one-half mile east of No. 2 on the same farm. In Geary district, Roane County, the King Oil & Gas Co. completed a test on the John Booth farm, a gasser in the Big Injun sand good for 500,000 feet. The location is 1 mile north of Noble Beattie's second test on the Fred Smith 42 acres.

In Sheridan district, Calhoun County, Martin Crawley has drilled deeper his No. 1, an old well, on the B. C. McManaway farm. It is dry in the lower sands. In Battelle district, Monogalia County, Patterson & McCracken have a gasser in the 30-foot sand at a test on the W. F. Taylor farm. In Union district, Tyler County, the American Oil Development Co. drilled deeper old No. 1 on the J. E. Gorrell farm. A light show of oil was developed in the Big Injun sand.

Gasser in Mingo County

At the mouth of Bredens Creek of Twelve Pole Creek, Harvey district, Mingo County, the Public Gas Corp. has drilled No. 7 on the Logan Cannel Coal Co.'s property, 33 feet deeper, to a total depth on 1,000 feet. It is a fair gasser in the Maxon sand, but no show of oil.

Duster in Pleasants

In Jefferson district, Pleasants County, P. A. Nee and others completed in the salt sand a test on the A. G. Ingram farm. It is a duster. In Grant district, L. P. Bickel & Son are drilling No. 5 on the A. V. Hammett farm. In Union district, L. C. White has shut down on account of no water at his test on the James Dennis farm.

On the waters of Sinking Creek, De Kalb district, Gilmer County, the South Penn Oil Co. has completed in the salt sand a test on the George Eldson farm. It is a good gasser, one-half mile east of the test on the Gertie Eldson farm. In Southwest district, Doddridge County, the American Oil Development Co. drilled deeper its second test on the James Reed farm, showing some gas in the Big Injun sand.

Lewis and Harrison Counties

In Hackers Creek district, Lewis County, the Standard Gas Co.'s test on the W. T. and N. E. Allman farm is a gasser in the fifth sand. In Eagle district, Harrison County, the Conservative Gas Co. has drilled to a depth of 2,835 feet and shut down. It will probably be abandoned. In the same district, the Clarksburg Light & Heat Co. has shut down at 2,045 feet on the S. D. Gore heirs' tract.

In Lee district, Calhoun County, the

(Continued on Page 327)

PRODUCER IN HOTEL COURTYARD; LEASES IN 20 MICHIGAN COUNTIES

By Whit
Staff Correspondent, Michigan Fields

SAGINAW, Mich., Sept. 17.—Work is getting less in the Saginaw Field, which has been very active during the past year or so, on account of the Saginaw Prospecting Co. shutting down its drilling tools, as this company usually had around seven strings running and other operators in the field are looking over other areas to do test work. While Saginaw is not being rushed, numerous other counties through all parts of the State are getting attention and quite a number of tests have been started, and many other prospects for tests, as large blocks of acreage are now under lease in close to 20 counties and by companies that will give the territory a fair test, wherever they drill.

Five completions are reported from the Saginaw and Gratiot County areas, four of which are in Saginaw County and one in Gratiot County.

The Saginaw Prospecting Co. has brought in its No. 4 on the Christian Scheizer property on the Barnard Road, at the north edge of the corporate limits of Saginaw, and it is said to show for 15 bbls. initially. This is the last well this company will drill for an indefinite period and will set easy with its nearly 70 wells drilled since it brought in the initial producer of the field on the city-owned Deindorfer Woods.

The Bancroft Hotel Co's well in the rear of the hotel, in the center of the city of Saginaw, found the top of the Berea sand at 1,810 feet and went 19 feet in the sand and gave it a show, with a showing for 25 bbls. initially. The Saginaw News has this to say of the Bancroft Hotel well:

"Drilling here has just proved an old prophecy. Many months ago when the Saginaw oil field development was just starting, State Geologist R. A. Smith in an address here said it was likely there was oil beneath the east side business district. No drilling anywhere near that locality had been done at that time.

"'It is probable that a well drilled in the lobby of the Bancroft Hotel would get oil,' said the geologist in substance, adding that that might be one of the best parts of the field, though nothing could be positively told regarding it at that time.

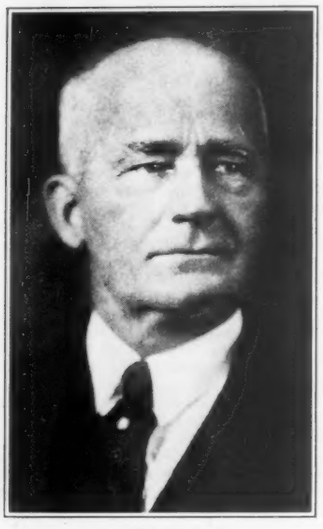
"Prediction that oil might be found at the Bancroft came true the other day when the Bancroft Hotel Co. drilled in its well in the court at the rear of the hotel. To be sure, it was not drilled in the lobby, but it was close enough to leave little doubt that there is oil beneath the lobby. Needless to say, it is hardly likely that any closer approach will be made.

"Completion of the well also recalled another prophecy, but of a different sort. Several oil men remembered that months ago a 'smeller,' a man who claimed to be able to determine the presence of oil by some mysterious means, spent a night in the Bancroft. The next morning he is said to have told friends that there was so much oil beneath the hotel reacting on his sensitive makeup that he was unable to sleep.

"But though the Bancroft well appears to be a reasonably good one, the grinning oil men who tell the story aver between winks and chuckles that they are unable

(Continued on Page 326)

MEN KNOWN IN OILDOM



J. Edgar Pew

J. Edgar Pew, chairman of the American Petroleum Institute Board of Directors' Committee on Standardization, and chairman of the American Petroleum Institute General Committee on Standardization, is one of the fathers of oil field standardization, and has contributed liberally to the advancement of this important equipment problem.

After 30 years' continuous identity with the oil and gas producing, manufacturing, and distributing business, Mr. Pew has a thorough grasp upon the equipment requirements of the industry.

He was born at Mercer, Pa., in September, 1870, and after preliminary education at the local grade and high schools, he spent four years at Iron City College, Pittsburgh, Pa., from which institution he was graduated at the age of 17.

He immediately entered the gas business in Pittsburgh, and remained there for three years. In 1899, he moved to the Ohio oil fields where the Sun Oil Company had substantial interests in production and refining. After two years in Toledo, Ohio, Mr. Pew was sent to Beaumont, Tex., when the great Spindletop Field was discovered in 1901. He managed the Sun Oil Company's business in the Texas fields for 11 years, when he was engaged to head the Carter Oil Company's western division when that subsidiary of the Standard of New Jersey entered the Mid-Continent territory.

He continued as general manager of the Carter Oil Company throughout that concern's period of expansion, and resigned in 1918 to again become identified with the Sun Oil Company.

He has been vice president and general manager of the Sun Oil Company since that time.

PERSONAL PARAGRAPHS

R. M. Young, president of the Carter Oil Compnay, is making a business trip to the East.

* * *

N. C. McGowen, president of the Palmer Corporation, of Shreveport, La., has been making a business trip in the East.

* * *

Dr. Leigh F. Watson, Chicago, and with oil interests in West Texas, is making a tour of the several West Texas areas.

* * *

W. G. Skelly, president of the Skelly Oil Company, has returned from a visit to New York, and is at his desk in Tulsa again.

* * *

L. E. Foust, superintendent of the Associated Oil Company's activities in the Kern River Field, presided at a recent meeting of the Bakersfie'd chapter of the Californin Chamber of Mines and Oil.

W. S. Farish, president of the Humble Oil & Refining Company, Houston, Tex., has returned from a business trip to the East.

* * *

Harry L. Norris, chief scout of the Prairie Oil & Gas Company, has returned to Tulsa, Okla., after a vacation spent in Kansas.

* * *

James H. Satterwhite, sales manager of Westcott & Greis, of Tulsa, Okla., has returned from a six weeks' vacation spent in California.

* * *

C. M. Schneidau, of the Pelican Well Tool & Supply Company, Shreveport, La., has returned from a week's business trip in Dallas, Tex.

* * *

L. E. Lewis, production man for the Simms Oil Company in the Church-Fields Pool of Crane County, West Texas, is ill with typhoid fever.

* * *

John B. Foster, president of the Foster Petroleum Company, of Tulsa, Okla., is back in harness after a month's rest on the Pacific Coast.

* * *

R. B. Strayhorn, in charge of the Transcontinental Oil Company's offices in Fort Worth, Tex., has returned to his duties following a vacation.

* * *

Roy Bennoit, general attorney for the Ohio Oil Company, at Shreveport, La., is making the trip to Paris, France, with the American Legion.

* * *

W. B. Sutton, Houston, Tex., manager of the land department of the Vacuum Oil Company, is spending his vacation touring through the Southwest.

* * *

Jack Lynch, assistant superintendent of the Ohio Oil Company, at Shreveport, La., has been spending a short time at his former home in Lima, Ohio.

* * *

A. W. Thompson, sales manager of the Westcott Valve Company, with headquarters in Tulsa, Okla., is spending his vacation at the old homestead, Bradford, Pa.

* * *

Carl A. Young, director of standardization of the American Petroleum Institute, with headquarters at Dallas, Tex., spent a few days in Tulsa, Okla., last week.

* * *

Waite Phillips, president of the Philmack Oil Company, of Tulsa, Okla., has returned to his desk after spending the summer months at his ranch in New Mexico.

* * *

Joseph Jensen, chief geologist of the Associated Oil Company, recently qualified as an expert in a court action involving the Gosnell-Lloyd suit at Ventura, Calif.

* * *

C. P. Butcher, chief geologist for the Kirby Oil Company in West Texas, with headquarters at San Angelo, has returned to his office from a vacation spent in Colorado.

* * *

Dow Hamm, assistant to the chief geologist of the Roxana Petroleum Corporation at Dallas, Tex., spent several days in the San Angelo, Tex., offices of the company recently.

* * *

Francis P. Smith, asphalt expert of the Union Oil Company of California, is expected to return to the home office in Los Angeles after an absence in New York of nearly a month's duration.

* * *

F. C. Van Cleave, of Shreveport, La., superintendent of the pipe line department of the Gulf Refining Company in Arkansas and North Louisiana, has been spending a two weeks' vacation at Hot Springs, Ark.

* * *

D. W. Spurlock, purchasing agent for the Standard Pipe Line Company, at Shreveport, La., is attending the American Legion Convention at Paris, France. Mr. Spurlock is the retiring head of the Legion in Louisiana.

* * *

Lacey Walker, assistant treasurer of the American Petroleum Institute in charge of statistical work, is en route to the main office of the Institute in New York after a tour of the Mid-Continent oil fields. He visited Tulsa, Okla., Dallas, Houston and Fort Worth, Tex., and Shreveport, La., on the trip, and made a tour of inspection of the Seminole Field.

E. R. Ratcliff, president of the Commercial Natural Gas Company of Shreveport, La., has been making an extended business trip to eastern cities.

* * *

Hughey Humphreys, head of the Skelly Oil Company, accounting department, has returned from a two months' vacation spent at his former home in England.

* * *

Dr. C. S. Ross and William Calder, of the Dominion government petroleum staff, of Calgary, have returned from an inspection of the tests drilling in Manitoba, Saskatchewan and southern Alberta.

* * *

Lawrence F. Burke, of Wichita Falls, Tex., member of the land department of The Texas Company, spent his vacation this year at his old home in Tennessee. He has just recently returned to his desk.

* * *

A. W. Duston, chief geologist and head of the land department of the Independent Oil & Gas Company, has resigned to enter the petroleum industry as an individual in the Mid-Continent Field. He is still a director of the Independent company.

* * *

B. L. Ryan, superintendent of the land department for the Roxana Petroleum Corporation in the Central Texas division with headquarters at Dallas, Tex., was a San Angelo, Tex., visitor for several days this week.

* * *

E. D. Lee, of San Angelo, Tex., with the land department of the Atlantic Oil Producing Company, accompanied by Mrs. Lee, have returned from a three weeks' tour through Colorado and Wyoming, including Yellowstone National Park.

* * *

M. A. Grisham, of Abilene, Tex., and Judge J. C. Hunter, of Van Horn, comprising the firm of Grisham & Hunter, were business visitors in San Angelo, Tex., last week. They are heavily interested in several West Texas counties including Winkler County.

* * *

Charles Johnson, chief scout for the Mid-Kansas Oil & Gas Company in East Texas, has been transferred to the main office of the Ohio Oil Company, at Findlay, Ohio. Joe S. Jones, of the Shreveport, La., office of the Ohio Oil Company, is acting scout for the Mid-Kansas in East Texas.

* * *

W. H. Wynn, head of the land department and in charge of Marland Oil Company of Texas, San Angelo division, and J. E. Farrell, land man in charge of the Abilene division, have gone to western New Mexico on a two weeks' vacation. Mrs. Wynn and Mrs. Farrell are accompanying them.

* * *

F. C. Baker, superintendent of the telephone and telegraph department of the Marland Oil Company, Ponca City, Okla., recently inspected the surveyed route for the Kay County Gas Company's projected pipe line from the Yates Pool to McCamey, Tex. Both telegraph and telephone lines will be strung paralleling the pipe line.

* * *

J. B. Jaqua recently resigned from the manufacturing and refining department of the Union Oil Company to engage in technical work dealing with the advancement of cracking and refining equipment. Mr. Jaqua will engage in private practice as a consulting engineer, specializing particularly in refinery equipment.

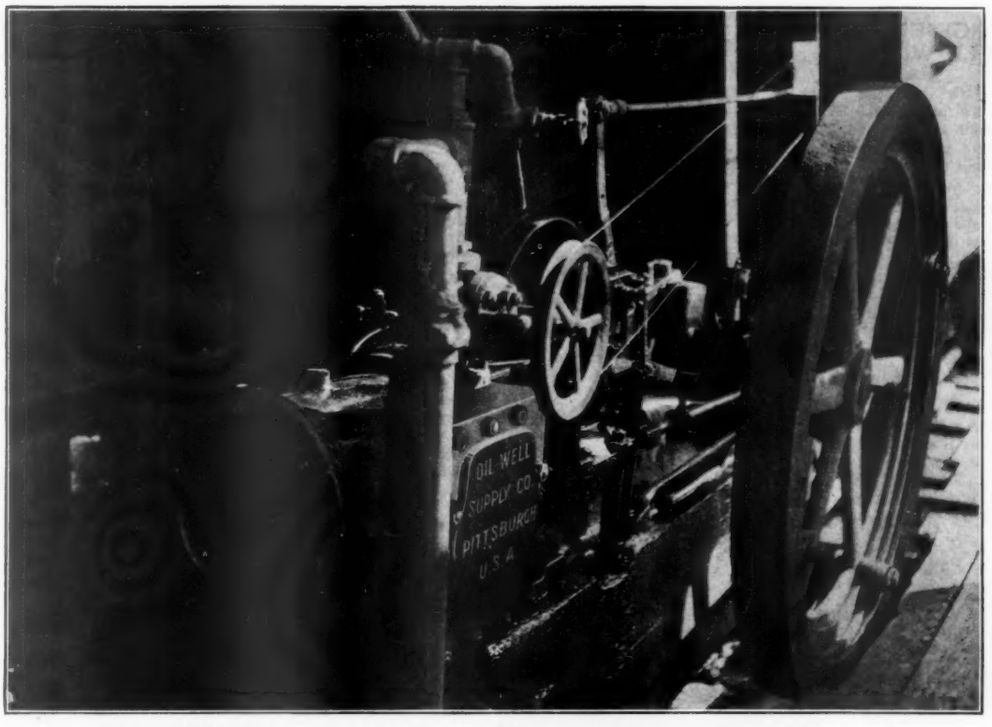
* * *

J. R. Pemberton, chief geologist for the Pan American Western Petroleum Company (Doheny interest) and Robert Lytle, head of the land department of the same company, are Fort Worth, Tex., visitors this week, guests of J. Elmer Thomas, independent operator and head of the Fort Worth Geological Society. They are looking over West Texas with a view to entering the area.

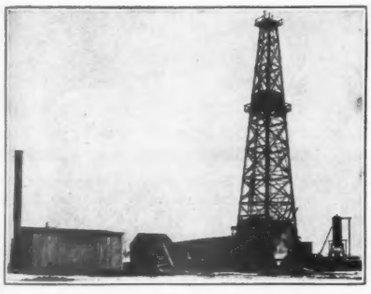
* * *

Charles P. Link, vice president of the Taylor-Link Oil Company, of San Angelo, Tex., left for Chicago last week to take in a few ball games and the Tunney-Dempsey set-to. He was joined in Dallas, Tex., by his son, Charles P., Jr., and will be away two or three weeks. The Link-Taylor Oil Company recently obtained its first production in Crockett County, offsetting the P. H. Williams well which a couple of months ago extended the Powell Pool a mile southward.

"IN OKLAHOMA"



This **"OILWELL"** *12 x 12 Engine drilled a well for the Roxana Petroleum Corporation near Garber, Oklahoma to a depth of 6,308 feet.*



Roxana Petroleum Corporation's Well near Garber, Oklahoma

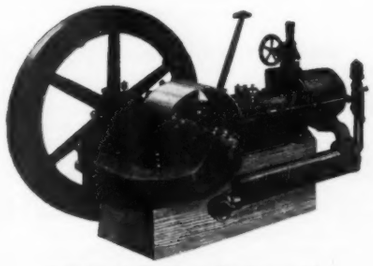
NOT only in Oklahoma but in every other oil field in the world, **"OILWELL"** Engines have a reputation for strength, power, durability and ease of operation.

They are constructed with the greatest care, undergoing frequent inspections during their manufacture, including a running test, and only men of long experience in building these engines are employed.

As drilling has become more severe, due to increased depth of wells and in consequence heavier strings of tools to be handled, **"OILWELL"** Engine shafts have been strengthened to meet these conditions by an outboard bearing.

This outboard bearing is carried by an arm rigidly attached to the bed, and the arm is of such design and strength as to always hold the outboard bearing in line with the two main bearings, thereby distributing an equal pressure to each of the three bearings. With the **"OILWELL"** Outboard Bearing a belt, already clamped together, can be put on the engine pulley without removing any part of the bearing.

Force feed oil pumps are standard equipment on all **"OILWELL"** Engines.



"OILWELL" *Drilling Engine with Outboard Bearing*

You can expect the Best from "OILWELL" Engines.

For further information inquire at any of our 100 branches

"OILWELL" ESTD. 1862 TRADE MARK. REGISTERED.

OIL WELL SUPPLY CO.

NEW YORK—LOS ANGELES—PITTSBURGH, U.S.A.—SAN FRANCISCO—TAMPICO—LONDON

WORLD'S OLDEST AND LARGEST MANUFACTURERS OF OIL FIELD EQUIPMENT

"OILWELL" ESTD. 1862 TRADE MARK. REGISTERED.

EQUIPMENT AND SUPPLIES

NEW TYPE GAS ENGINE FOR OIL FIELD WORK

First announcement of the designing of a new type of gas engine for oil field work and also of completion of the first model of the new machine was made by the Joseph Reid Gas Engine Co.

The new engine is a two-cycle, type C gas engine and is particularly designed for drilling purposes, swabbing, cleaning out, pumping beam wells particularly in sandy country and can also be used for general power work. In tests at the Reid shops the new engine developed 40 horsepower at 180 revolutions a minute and showed that it was capable of developing over 70 horsepower.

The new engine has a bore which is 12¼ inches and a stroke of 16 inches. It has an enclosed crank case with a splash oiling system and replaceable babbitt bearings. The governor is of a type developed at the Reid shops and designed especially for this engine. The governor is entirely enclosed and runs in a bath of oil. The engine uses Wico ignition and has an automatic oil starter valve. The intake valve is of a special Reid design and by the use of it the engine is able to secure high volumetric efficiency. Materials used are of all cast iron parts made in the Reid foundry.

The crank for the engine is a one-piece steel forging and is fitted with counterweights completely enclosed and engine is almost completely enclosed and sand and dirt can not get into the moving parts. The design is simple and rugged.

This is the second new product to be turned out recently at the Reid shops. The other was the Reid Type PX band wheel power, designed to meet the demand for a band wheel pumping power capable of handling heavy wells where the total power requirement is as high as 100 horsepower.

HAYS CORPORATION CHANGES

The Hays Corp., Michigan City, Ind., manufacturers of combustion instruments, announces the addition of several new representatives to its United States sales organization. The following appointments have been made: S. Thomas Engineering Co., 6625 Delmar Boulevard, St. Louis, Mo., for eastern Missouri and southern Illinois; Joseph H. Spurgeon, 3-224 General Motors Building, Detroit, Mich., for eastern Michigan and northwestern Ohio; H. R. N. Johnson, 621 New York Life Building, Minneapolis, Minn., for Minnesota and the Dakotas; Louis Towner Construction Co., 551 Valley Avenue., N. W., Grand Rapids, Mich., Grand Rapids and contiguous territory.

ROOTS COMPANY CHANGES

The P. H. & F. M. Roots Co. of Connersville, Ind., has announced important changes in the management of their New York and Chicago office. William S. Guitteau has been appointed eastern district manager to succeed H. M. Papworth, who has retired from active business. Mr. Guitteau has had a very wide experience among industrial interests and public utilities. Albert E. Loud, who has been connected with the New York office for a number of years, has been appointed assistant eastern district manager. The Chicago office is in charge of Bowen T. Ehrman, formerly with the West Gas Improvement Co.

NEW BOWLEGS STORE

Murray Tool & Supply Co., of Tulsa, Okla., has opened a new store at Bowlegs in the Seminole field.

LANGAN NOW DIRECTOR OF HILL-HUBBELL CO.

G. G. Langan of Tulsa, Okla., has recently been elected a director of Hill, Hubbell & Co. of San Francisco, Calif., and was also made vice president and general manager of the Hill, Hubbell & Co. of Texas.

Mr. Langan has been Mid-Continent manager of the Hill, Hubbell interests since the company entered that field, and under his supervision the Tulsa plant

G. G. Langan

Director, Hill, Hubbell & Co., San Francisco, Calif. Vice President, Hill, Hubbell & Co. of Texas.

was constructed. During his connection with the firm, its line of preservative paints has had a wide application in the petroleum industry.

Starting in the oil industry during boyhood, he chose the pipe line branch as a field for his efforts, and he has strung pipe through the old fields of Ohio, Indiana and Illinois. He served for many years under Martin Moran when Mr. Moran was general superintendent of the Buckeye Pipe Line Co. This background affords him an intimate insight into the preservative requirements of the industry especially in pipe line protection.

IVERSON TOOL COMPANY BUYS OKMULGEE STORE

The Iverson Tool Co., with main offices in Tulsa has purchased the supply store, warehouse building, and real estate formerly owned by the International Supply Co. at Okmulgee, Okla. The real estate consists of one city block on which are located the supply store building, warehouse, and machine shop building. During the past year the Iverson Tool Co. has operated the machine and blacksmith shop, and rented the shop building from the International Supply Co. The Iverson Tool Co. will continue to operate the supply store in conjunction with their shop.

NEW WIRE ROPE COMPANY

Harry W. Black has been made vice president, in charge of operations and sales of the Black Wire Rope Co., Peoria, Ill. This company was recently organized to manufacture wire rope. Mr. Black was formerly president of the Black Steel & Wire Co., Kansas City, Mo., now the Union Wire Rope Co.

GAS DRILLING ENGINE FEATURES DESCRIBED

The Young Engine Corp. of Canton, Ohio, has placed on the market a recently developed gas drilling engine described as possessing several unique features in construction and operation. The engines are suitable for use in connection with either rotary or cable tool drilling rigs, the only change necessary being the substitution of a sprocket for the pulley used with cable tool rigs. The complete equipment consists of a Hercules four-cylinder engine, from 50 to 100 horsepower, and a speed reduction gear having a ratio of 3.6 to 1, mounted as a unit on a heavy riveted steel base. The whole unit is very compact, the overall dimensions being 12 feet, 3 inches long, and 50 inches wide overall. The weight is about 6,000 pounds, which makes it light enough to be readily portable.

The engine is of the standard four-cylinder type of industrial engine, suitable for operation on either gas or gasoline. It is equipped with an electric starting motor, generator and storage battery. It is also equipped with a regulation telegraph speed control. The engine proper is completely enclosed in a strong, galvanized iron hood, which can be locked so as to prevent any tampering with the motor. A cast tank radiator of ample capacity provides positive cooling under all conditions of operations.

REGAN CO. OFFICIALS ON EXTENSIVE TOUR

Leaving upon an extensive business trip September 18, Joseph Regan, president, and Bert Cleveland, sales manager for Regan Forge & Engineering Co., expect to spend from six to eight weeks in the East. They will first visit the Exposition at Tulsa and will then make an extensive tour through the Mid-Continent and Gulf Coast fields, spending several days in Pampa, the Seminole field, and in Oklahoma City. They will also visit their office in Houston, after which they will depart for Galveston. They will then visit New Orleans where they will take a boat to New York City to spend several days in the New York office of the company, arranging for foreign business. Returning westward they will make calls in several oil fields and will stop in Chicago and St. Louis. They will return to California about November 1.

FOR DUSTY INSTALLATIONS

Dust-tight, boiler-plate enclosing cases for wall mounted, general purpose starters are announced by the General Electric Co. These are recommended for very dusty installations, such as foundries, cement mills, cotton mills, coal mines, coke plants, etc., for installations where mechanical strength is desired, such as steel mills and coal mines, and for installations where protection against steam or fumes is necessary, such as paper mills.

TRADE LITERATURE RECEIVED

From Master Builders Co., Cleveland, Ohio, a folder describing a new material and method for the protection and curing of new concrete floors. The material is called "Stainproof."

From International Nickel Co., New York, two publications, "The Economic Value of Nickel in Cast Iron" and "Effect of nickel on machineability of cast iron." These are part of a series of semi-technical bulletins of growing interest to producers and consumers of this product.

FOR WORKING EXHIBIT OF WELDING PROCESS

The Fusion Welding Corp., an associate of the Chicago Steel & Wire Co., One Hundred and Third Street and Torrence Avenue, Chicago, is planning a novel and quite extensive exhibit at the National Steel and Machine Tool Exposition, held at Detroit. In addition to a working exhibit of welding at its booth, a lecture hall in the main exposition building has been arranged for, seating 150 people. In this hall will be shown slow motion movies of both arc and oxy-acetylene welding taken with invisible infra-red light. These pictures are all close-ups of the welding action and enlarge the ordinary welding rod so that it shows several feet in diameter on the screen. In this way the actual transfer of metal in welding can be clearly seen, and due to the fact that infra-red light penetrates the haze always surrounding the welding action, far more can be seen than by the naked eye.

Extreme cases have been selected for these pictures so that the effects of the structure and chemical composition of the welding rod, together with the structure and composition of the surface materials, is plainly brought out showing the effect of each change on the welding operation.

SUPERRENCH DESIGNED

On many machines and almost every auto there are awkwardly placed nuts and bolts. Ordinary wrenches won't reach or turn them, but the manufacturers say the new obstruction "Superrench", made by J. H. Williams & Co., Buffalo, N. Y., will. Its narrow, pointed jaws

and thin heads with 75 degree angle of openings are especially designed for just such jobs.

Because the jaws of both heads project from the same side of the handle, these wrenches offer a comfortable grip for the operator's hand. It is said to be a peculiar advantage of this wrench that, when used in the natural manner for comfort, its strength is considerably increased.

Furnished in a wide variety of sizes for all popular U. S. and S. A. E. standard nuts and cap screws.

GASOLINE ABSORPTION PROCESS DESCRIBED

An illustrated book has just been published on the process of natural gasoline absorption by J. A. Campbell, natural gas engineer, of Long Beach, Calif.

The book delves into the many factors involved in extraction of gasoline from natural gas and is well illustrated, showing views of every part of a natural gasoline plant, including close-up illustrations of absorbers, strippers, interchangers, scrubbers, inlet and outlet lines, pumping mechanism, arrangement of cooling coils, and dephlegmators.

The cycle of operation starting with the gas coming from the well, passing through the absorber and changed to dry gas and also the manner in which the gasoline is handled and treated after being removed from the natural gas is described in understandable language that any layman can comprehend. A complete explanation is made of the manner in which billions of bubbles are used to absorb gasoline.

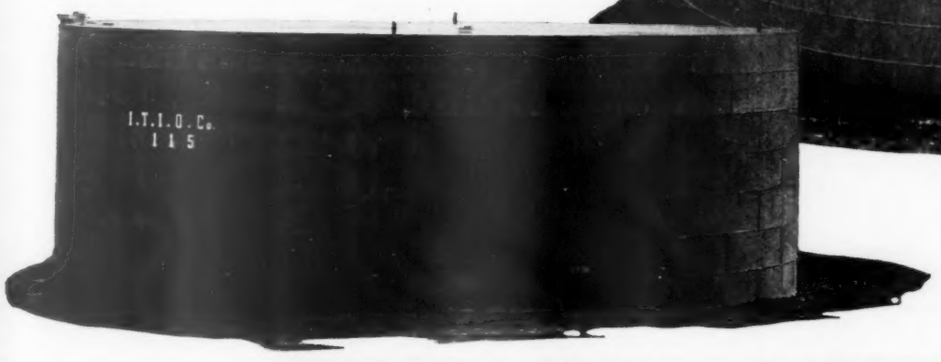
In Booth 2 at Tulsa

See the working models of both the new Wiggins Breather Roof and the well-known Wiggins Floating Roof on exhibit at the International Petroleum Exposition, September 24 to October 1.

THE Wiggins Floating Roof is in general use on working tanks. It rises and falls with the oil level—seals the oil in and the air out—stops evaporation, thermal breathing, and splashover losses.

The Wiggins Breather Roof is the newly developed type particularly applicable to standing storage. It has already demonstrated its ability to stop evaporation on such tanks as effectively as its companion, the floating type. It is a gastight roof flexing up and down like a diaphragm. The Wiggins Breather Roof sets an entirely new standard of evaporation protection for standing storage.

Below — Wiggins Floating Roof on a Working Tank.



At Left — Wiggins Breather Roof on a Standing Storage Tank.

CHICAGO BRIDGE & IRON WORKS

CHICAGO, 2128 Old Colony Bldg.
NEW YORK, 3147 Hudson Terminal Bldg.
CLEVELAND, 2204 Union Trust Bldg.
DALLAS, 1641 Dallas Nat'l Bank Bldg.
ATLANTA, 1054 Healey Bldg.
SAN FRANCISCO, 1054 Rialto Bldg.
HAVANA, CUBA, Apartado 2507

WIGGINS FLOATING *for working storage* **BREATHER** *for standing storage* **ROOFS**

O&GJ 9-22 Gray

Natural Gas Developments

NEW SAND DISCOVERED IN REFUGIO GAS FIELD

SAN ANTONIO, Tex., Sept. 17.—Houston Gulf Gas Co., on acreage in the Refugio gas field in Refugio County belonging to William F. Morgan, Inc., has completed No. 6 Shelly, with a rock pressure of 1,400 pounds and a volume of 60,000,000 feet of gas, in a sand at 3,290-3,305 feet. It is one of the biggest gas wells ever brought in in Southwest Texas and is in an entirely new sand in the Refugio Field.

Shallower sands in the Refugio Field have been putting 70,000,000 feet of gas daily into the two pipe lines running to Houston for many months, and this newer sand, with much higher rock pressure and bigger volume, if the sand proves as extensive in area, will probably much more than double the ultimate production of the field. Also, it leads the way for the exploring for still other deeper sands.

Formations near the Gulf are such it is claimed it is impossible to drill so deep as to run out of possible producing formations and encounter such formations as schist or granite. It is claimed that a well to 10,000 feet or more, if it were possible to drill that deep, would still be in formations that could produce oil or gas.

No. 6 Skelly was drilled on agreement between William F. Morgan, Inc., and Houston Gulf Gas Co. for the purpose of testing deeper sands, and the first well drilled has been a big success. Eight or nine other tests drilling in the field have been shut down waiting the outcome of the deep test and will no doubt now be drilled to the deeper sand.

GAS LINE EXTENSION IN SAN ANTONIO AREA

SAN ANTONIO, Tex., Sept. 17.—Southern Gas Co. has let the contract to N. A. Saigh of this city for 55 miles of 8-inch gas main to be laid from San Antonio to New Braunfels and Seguin, northeast of San Antonio. It will be an extension of the company's line into this city. Also distributing systems will be put in both at New Braunfels and Seguin, which are included in the contract. The entire extension will cost around $750,000. Work has already started.

Southern Gas Co. has a line from the Mirando district through the Calliham Field and into San Antonio, a distance of nearly 150 miles; and also a line from the Adams gas field into San Antonio from the west, a distance of 40 miles, which lines have been in operation for some time.

WEST VIRGINIA GAS CORP.

Owens Bottle Co. is laying a new 8-inch pipe line from the Commercial Field of West Virginia Gas Corp. to its Huntington plant. It is expected that the new line will be completed before October 15, and that the entire requirements of Owens Bottle Co.'s Huntington plant, between 2,000,000 and 3,000,000 feet of gas daily, will thereafter be supplied by West Virginia Gas Corp.

GAS RATE CASE

CHATHAM, Ontario, Sept. 17.—The city of Edmonton has given notice of appeal against the gas rate order of the Alberta Public Utilities Commission, which recently granted Edmonton a 3-cent per thousand reduction in rates.

YOAKUM GETS GAS

YOAKUM, Tex., Sept. 17.—Natural gas has been turned on in Yoakum.

AMARILLO-DENVER LINE ASSURED AS CITY FRANCHISE IS CLOSED

By T. R. Ingram

DENVER, Colo., Sept. 17.—The Denver City Council has passed on final reading an ordinance directing the Public Service Co. of Colorado to supply the city with natural gas and the measure will become effective upon being signed by the mayor. Mayor Stapleton is due to return to the city within a few days when it is expected he will attach his signature to the measure. The final vote on the ordinance was six to three, a sufficient majority to pass it over the mayor's veto, if necessary, but no such necessity is expected to arise. Litigation designed to have the ordinance referred to the people for a vote, which was predicted, has not so far materialized and threatened opposition from the coal operators simmered down at the last moment to the presentation of an informal petition to the council protesting against the passage of the measure.

It was announced by George H. Shaw, general counsel for the Public Service Co., immediately following the action by the council, that the Colorado Interstate Gas Co., which will pipe the gas from the Texas Panhandle to Denver and intermediate towns, will commence construction work on the line at once and that plans provide for having the line completed and gas available for the city in time for the winter of 1928. Work will progress simultaneously from the Amarillo and Denver ends and plans provide for getting as much of the pipe under ground as possible before winter sets in.

Ford, Bacon & Davis, New York engineering firm, will direct the construction of the line for the Colorado Interstate Co. This firm, at present, is working out of Colorado Springs. A considerable part of the work, such as trenching, etc., will be done by contract and it is expected that four or five concerns will have contracts for parts of the line. Tentative provisions for rolling the pipe have been made. Right-of-way matters are now being closed up.

The Public Service Co. of Colorado owns the local distributing company at Pueblo and the only steps necessary to complete the arrangement for supplying gas to that city is the adjustment of rates. The city council of Pueblo has submitted to the local company a proposed schedule for manufactured gas rates as an alternative to a proposal from the company. This schedule is expected to form the basis for the establishing of rates for natural gas. The gas distributing system at Colorado Springs is owned by the municipality and negotiations between the Public Service Co. and the city are in progress. These may result in the company taking over the municipally-owned plant and operating it.

A tentative agreement between the Colorado Interstate Gas Co. and the Colorado Fuel & Iron Co. for supplying the latter with natural gas for its steel mills at Pueblo was signed some time ago. At the time it was signed, it had not been definitely decided to construct the line, the decision depending upon the outcome of the Denver negotiations. The contract provides for a rate of 16 cents per 1,000 feet for part of the contractural period and 18 cents for the remainder. Similar tentative contracts were made for portland cement plants operated by the Ideal Portland Cement Co. at Portland and Concrete, west of Pueblo.

The Public Service Co. expects to have under way shortly the work of preparing the Denver system for conversion from manufactured to artificial gas. This will include the construction of 20 miles of 20-inch intermediate high pressure pipe line around the city starting at the southeastern limits where the Colorado Interstate Co. will make delivery of the gas. The contract with Denver provides that the gas shall have a heating content of 800 B.t.u. at Denver, equivalent to 1,050 B.t.u. at sea level. Helium and natural gas gasoline may be extracted before delivery to consumers.

GAS FOR BRADY, TEXAS, PLANNED BY OPERATOR

SAN ANGELO, Tex., Sept. 10.—Brady will be supplied with natural gas from one or more wells by Charles N. Cope, San Angelo oil operator, who has made the contract with Wakefield & Bryant of Brownwood. The wells are to be drilled on the east half of P. C. Dutton survey 585 in McCulloch County. A 4-inch welded line will be started from the field by the Brownwood operators to Brady, a distance of 12 miles. The gas supply is expected to be ready before the line is completed.

Wakefield & Bryant will drill a 900-foot test on 40 acres offsetting on the east the 40 acres on which Roy Ragsdale of Brownwood brought in a gasser at 774 feet which gauged 5,400,000 feet a day. Brady will use only 500,000 feet a day, it is estimated. The city of Brady gave a gas franchise to Mr. Ragsdale, from whom the Brownwood operators acquired it.

Oil possibilities will be tested, as the gasser sprayed some oil. The well will be drilled by Ragsdale on one of four 40-acre leases held by Mr. Cope and Blackstone & Slaughter of San Angelo. Should oil in commercial quantities be found, another well for gas will be drilled. The test is 1,200 to 1,500 feet east of the Ragsdale gasser and 400 feet from the north and west lines of Cope and Blackstone & Slaughter's 40 acres, which constitutes the south half of the east half of survey 585.

OTTAWA COMPRESSOR WORK PROGRESSING

Satisfactory progress is reported on the main building facilities at the Ottawa, Kans., compressor station of the Empire Gas & Fuel Co., and the erection of the Cooper engines has been started. Most of the concrete main floors have been finished and the steel framework is in position.

The assembly of the big engines will be aided greatly by use of two 10-ton traveling cranes which have been installed. The steel framework for the auxiliary building has also been erected, and the installation of machinery at this point is progressing rapidly. The dam and spillway are now practically complete, and the impounding of water for cooling purposes will commence within the next two weeks.

It is expected that work will start immediately on the installation of the yard piping, and much of the grading about the station is now complete.

MAY EXPORT ALBERTA GAS

CHATHAM, Ontario, Sept. 17.—It is reported that the Northern National Gas & Development Co., which is planning to build a natural gas line from the Kevin-Sunburst Field to Great Falls is also contemplating a line to the Alberta border to take the production of the Rogers-Imperial gasser east of Coutts. This well is reputed to have 62,000,000 feet open flow for which there is no immediate market in Alberta.

KANSAS CITY GAS CO. FILES NEW SCHEDULE

KANSAS CITY, Mo., Sept. 17.—The Kansas City Gas Co. has filed with the Public Service Commission its new schedule of rates, which includes two low steps applicable to industrial gas users.

The schedule of rates as it will be if the commission approves the added scales:

Seventy-five cents for the first 400 feet.

Nine cents a hundred for the next 1,600 feet.

Eight and one-half cents a hundred for the next 48,000 feet.

Eight cents a hundred for the next 250,000 feet.

Six and one-half cents a hundred for the next 300,000 feet.

Two cents a hundred for the next 24,400,000 feet.

Sixteen and one-half cents a thousand cubic feet for all over 25,000,000 cubic feet.

No change is made in the rates to domestic consumers, the changes being effective only in instances where a consumer uses more than 300,000 cubic feet a month.

John T. Barker, city counseler, has announced that he will ask the Public Service Commission to grant Kansas City a hearing on the rate structure revision, hoping that a reduction may be obtained on the primary rates which affect domestic consumers.

INDIAN TERRITORY COMPLETES GASSERS

Indian Territory Illuminating Oil Co. completed gas well No. 369 in the NE of Section 17-27-11, Oklahoma, for a volume of 2,225,000 cubic feet of gas at 1,930 feet, with a rock pressure of 425 pounds.

No. 371, SE Section 20-23-8, Osage County, Oklahoma, was completed at a total depth of 1,317 feet for an initial of 1,750,000 cubic feet, with a rock pressure of 340 pounds.

No. 372, SE Section 22-7-11, Osage, which was being drilled for gas, was completed as an oil well producing about 20 bbls. before shot. This well was turned over to the oil lessee.

The Indian Territory Illuminating Oil Co. is drilling seven wells on its Osage lease and deepening four exhausted wells.

Work is rapidly nearing completion on the enlargement of the Indian Territory Illuminating Oil Co.'s booster station in Section 30-25-8 to deliver residue gas from The Texas Company's gasoline plant into the Empire's gas lines. When the installation of the 170-horsepower Cooper type 80 twin gas engine is complete, the station will have a total capacity of about 3,000,000 cubic feet daily. This unit will be ready for operation about September 20.

GALVESTON GAS RATES

GALVESTON, Tex., Sept. 17.—With the naming of a committee by L. W. Reed, president of the Chamber of Commerce, negotiations with the Galveston Gas Co. on the natural gas rate issue are expected to be started soon. The committee consists of Charles S. Peek, W. A. Eicher, Clark W. Thompson, S. C. Griffin and Brantley Harris.

MONROE REGAUGING

SHREVEPORT, La., Sept. 17.—The Louisiana Department of Conservation has completed its semiannual regauging of gas volumes and pressure in the Monroe Field of the northeastern part of the State, according to W. F. Chisholm, director of the minerals division. The department now is compiling and classifying results of the survey.

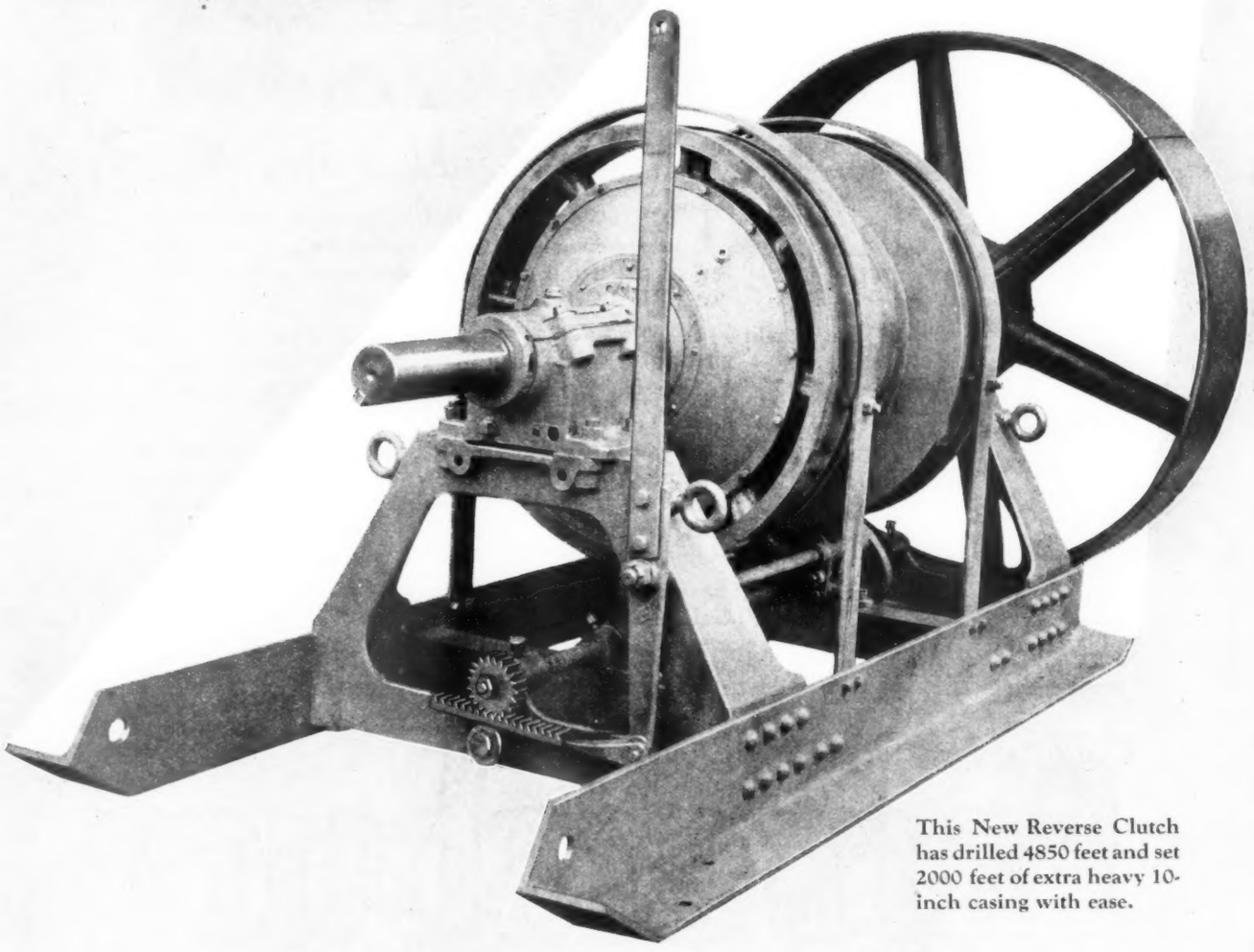
Now A

CLIMAX

Paymaster Reverse Clutch

Specially designed for *Climax Paymaster 6 Drilling Engine.*

Stop by our demonstration well at the Petroleum Show and watch this new unit actually make hole.



This New Reverse Clutch has drilled 4850 feet and set 2000 feet of extra heavy 10-inch casing with ease.

CLIMAX ENGINEERING COMPANY, Clinton, Iowa

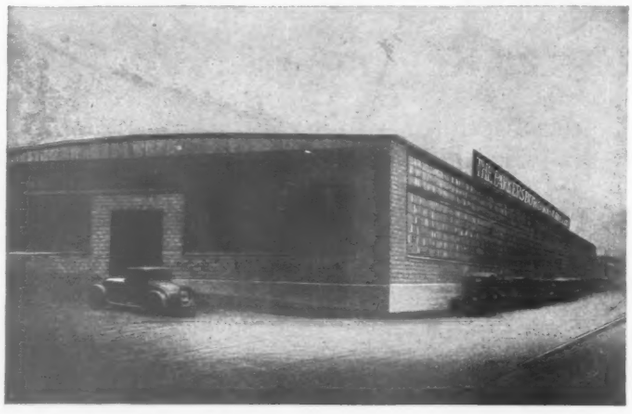
DISTRIBUTED BY

THE NATIONAL SUPPLY COMPANIES

See the Climax Paymaster Junior. Spaces 130, 131, 132, Oklahoma Bldg.

PARKERSBURG
Rig Irons
Including Common,
California
and A. P. I. Standard
☐
PARKERSBURG
Steel Wheels
☐
PARKERSBURG
Steel Derricks and
Steel Crown Blocks
☐
PARKERSBURG
All Steel
Standard Rigs
☐
PARKERSBURG
Portable
Drilling Machines
Wood and All Steel
☐
PARKERSBURG
Chain Driven
Sand Reels
and Bailing Reels
☐
PARKERSBURG
Bolted
Steel Tanks
☐
PARKERSBURG
Miscellaneous
Drilling Equipment
☐

Check the equipment in which you are interested, tear out and return this page to us, and we will send complete information.



Where Quality Begins

THIS modern, daylight foundry, the largest in the world devoted exclusively to the casting of rig irons, is where the quality of Parkersburg Rig Irons begins.

From the selection and purchase of raw materials through the manufacture of the finished product, Parkersburg's rigid standards of quality must be strictly adhered to.

This explains the remarkable service record of Parkersburg Rig Irons in every field — explains their world-wide acceptance and the economy and satisfaction that they are giving to users everywhere.

The complete Parkersburg line includes Common, California and A.P.I. Standard Rig Irons.

QUALITY PARKERSBURG SERVICE

The Parkersburg RIG & REEL COMPANY

Main Office and Works, Parkersburg, W. Va.

Sales Offices and Stocks Carried in Every Producing Field

WILDCAT OPERATIONS IN WEST TEXAS

(Continued from Page 62)

CRANE COUNTY

Marland Oil Co.'s No. 1 Union Land, E cor. of W ¼ Sec. 28, Blk. 35, H. & T. C. Sur., elev. 2,298 ft. ..... Total depth 825 ft.; underreaming 8-in. at 725 ft.

CROCKETT COUNTY

George Anderson and Marland Oil Co.'s No. 1 University.. Hole full sulphur water 1,800 ft.; one-half bailer oil 2,240 ft.; one-half bailer sulphur water per hour 2,475 ft.; shut down 2,475 ft. in lime.

V. T. Bolin & Co.'s No. 1 P. C. Coates, NW cor. SW Sec. 4, Blk. 2, I. & G. N. Sur. ..... Shut down 2,110 ft.
Corbett & Gill's No. 1 Todd ..... Saut down 641 ft.; set 12-in.
Corbett & Gill's No. 1 University ..... Saut down 641 ft.; set 12-in.
J. S. Cosden, Inc., No. 1 Paul Perner, SW cor. Sec. 36, Blk. 2, I. & G. N. Sur. ..... New location.
Gulf Production Co.'s No. 2 Powell-D ..... Top salt 1,060 ft.; drilling out boulder 2,345 ft.

Gulf Production Co.'s No. 1 G. L. Thompson, SW cor. Sec. 71, Blk. 1, I. & G. N. Sur. ..... Top big pay and total depth 988 ft. (corrected); flowed 600 bbls. first hour and 527 bbls. second hour with two strings tools in hole; pinched to 30 bbls. hourly and went to water, making 32 per cent b.s. and water; shut in.

Gulf Production Co.'s No. 2 G. L. Thompson ..... Rig.
Epencaur et al's No. 1 Noelke, SW Sec. 30, Blk. GG, G. C. & S. F. Sur. ..... Shut down 352 ft.
George A. Henshaw and Geyer Oil Co.'s No. 1 Noelke-Murphy, 660 ft. S and E of NW cor. Sec. 10, Blk. PP, T. C. Ry. Sur., A-5,148 ..... —
C. A. Jones et al's No. 1 Powell ..... Drilling 1,330 ft.
Magnolia Petroleum Co.'s No. 2 Shannon ..... Drilling 360 ft.
Show oil 2,385-90 and 2,992 ft.; total depth 4,100 ft.; fishing 20 joints 8-in. casing.

Newman Oil Co.'s No. 1 B. C. Clark ..... Location.
William Shaffer et al's No. 1 University, C SE SE Sec. 9, Blk. 47, University Sur., elev. 2,344 ft. ..... Total depth 2,344 ft.; plugged back to 2,208 ft.; shot 10 qts. 2,170-95 ft.; shut down 2,344 ft.

William Schaffer et al's No. 2 University, 1,350 ft. N and 2,610 ft. E of SW cor. Sec. 9, Blk. 47, University Land ..... Top salt 1,060 ft.; first oil show 2,190-96 ft.; second 2,225-29 ft.; shut down; about 30 ft.; oil in hole; drilling 2,360 ft.

W. W. Donnelly & Young's No. 1 Massey, Sec. 29, Blk. U-V ..... Drilling 100 ft.
W. W. Donnelly, Young, Logan & Hult's No. 1 Pierce, C SW Sec. 150, Blk. O, G. H. & S. A. Sur., elev. 2,105 ft. ..... Rain ow show 454 and 540 ft.; drilling black lime 1,555 ft.

Kirby Oil Co. and Taylor-Link Oil Co.'s No. 1 Powell.... Pay 2,572-94 ft.; swabbed 290 bbls. in 12 hours.
P. H. Williams' No. 2 L. P. Powell ..... Top pay 2,604 ft.; drilling 2,618 ft.; 1.0 ft. oil in hole.
McMammon Oil Co.'s No. 1 Blakeney ..... Drilling 750 ft.
World Oil Co.'s No. 1 Sorg ..... Location.
World Oil Co.'s No. 1 Powell, Sec. 52, Blk. BB, G. C. & S. F. Sur. ..... New location.
Young & Donnelly's No. 1 J. M. Shannon, C Sec. 11, Blk 9, D. & S. E. Sur. ..... Spudded and shut down.

CULBERSON COUNTY

James H. Gardner et al's No. 1 Radford, C SE Sec. 29, Blk. 62, Public School Land Sur. ..... Shut down at 585 ft. for 10-in. casing.

Scott & Dittman's No. 1 Miller, SW cor. NW NE Sec. 1, School Blk. 97 ..... Spudded and shut down.

DAWSON COUNTY

R. R. Penn's No. 1 Wright, elev. 2,842 ft. ..... Top salt 1,750 ft.; set 8-in. 2,449 ft.; drilling 3,190 ft.

ECTOR COUNTY

J. S. Cosden, Inc., et al's No. 2 Connell-A, NW cor. NE Sec. 13, B-16, School Land, elev. 2,844 ft. ..... Top salt 870 ft.; top lime 3,177 ft.; first show 3,420-22 ft.; pay 3,471-3,515 ft.; 160 ft. oil in hole; shot 180 qts.; estimated 1,000,000 ft. gas; swabbed and flowed 82 bbls. June 30; cleaned out and shut down for orders; 800 ft. oil in hole.

J. S. Cosden et al's No. 2 G. W. Connell-A, SE cor. NE Sec. 13, Blk. B-16 ..... Top salt 863 ft.; show oil 3,375 ft. and 3,499 ft.; top lime 3,195 ft.; shot 208 qts. 3,465-3,545 ft.; 300 ft. oil in hole; shut down.

FISHER COUNTY

Hucony Gas Co. No. 1 Langford ..... Hole full water 3,280 ft.; total depth 3,315 ft.; hole underreamed to bottom.

Ideal Oil Co.'s No. 1 Jameson, C SE Sec. 111, Blk. 1, H. & T. C. Sur. ..... Hole full salt water 2,345-2,520 ft.; shut down for orders 3,304 ft.

Marland Oil Co. and Texon's No. 1 McCall, Sec. 108, Blk. 3, H. & T. C. Sur. ..... Rig.
Miley Oil Corp. and Marland Oil Co.'s No. 1 W. W. Ammons, Sec. 198, Blk. 3, H. & T. C. Sur. ..... Drilling 3,465 ft. in slate.

R. W. Raney's No. 2 Maberry, Sec. 56, Blk. 1, T. & P. Sur. ..... Shut down for orders 2,725 ft.
Sinclair Oil & Gas Co.'s (was Bourdon Royalty Co.'s) No. 1 J. A. Danise, Sec. 6, Blk. K, T. & P. Sur. ..... Hole full water 2,830 ft.; drilling 2,914 ft.

The Texas Company's No. 1 D. S. Stevens, C SW SE SE Sec. 79, Blk. 1, H. & T. C. Sur. ..... 8-in. froze 2,302 ft.; fishing.

GAINES COUNTY

Westheimer & Daube's No. 1 Birge & Forbes Land Co., Sec. 308, Terrell County School Land. ..... Cemented 8-in. 3,900 ft.; drilling 3,980 ft.

GARZA COUNTY

Emerald Oil Co.'s No. 1 D. Boren, NW cor. NE Sec. 137, Blk. 5, H. & G. N. Sur. ..... Small show oil in gray lime 1,884-1,902 ft.; shut down 2,600 ft.; show oil and hole full water 2,420-60 ft.

GLASSCOCK COUNTY

California Co.'s No. 1 W. B. Currie, Sec. 215, Blk. 29, elev. 2,540 ft. ..... Water sand 1,085-90 ft.; drilling 2,310 ft.

Green et al's No. 1 F. G. Oxsheer, Sec. 6, Blk. 34, T. & P. Sur., elev. 2,540 ft. ..... Shut down for orders 3,661 ft.; hole full sulphur water.

World Oil Co. and J. S. Meriwether's No. 1 L. S. McDowell, C SW Sec. 43, Blk. 34, Twp. 2-S, T. & P. Sur., elev. 2,553 ft. ..... Top salt 1,180 ft.; hole full sulphur water 3,225-35 ft.; drilling 3,475 ft.

HOWARD COUNTY

California Co.'s No. 1 Fisher Brothers, SE SW NW Sec. 36, Blk. 33, T. & P. Sur. T-1-S ..... Drilling 900 ft.
Sweeney et al's (was Fred Carey et al's) No. 2 G. O. Chalk, SE NW Sec. 124, Blk. 29 ..... Total depth 1,040 ft.; rigging up to drill deeper.

W. W. Donnelly et al's No. 1 Martin, SE cor. Sec. 41, Blk. 33, T-2 N. T. & P. Sur. elev 2,552 ft. ..... Drilling 2,685 ft.
Henshaw et al's No. 1 S. T. Eason, Sec. 6, Blk. 32, T. & P. Sur., T-2-S ..... Show oil 1,340-54 ft.; shot 40 qts.; another show in sandy lime at 1,720-1,805 ft.; drilling.

Henshaw et al's No. 1 W. R. Settles ..... Drilling 1,215 ft.
Marland Oil Co. and Zoch's No. 1 Jones, Sec. 32, Blk. 27, T. & P. Sur., elev. 2,218 ft. ..... Shut down 500 ft.
Marland Oil Co.'s No. 1 A. M. Fisher, Sec. 1, Blk. 33, T. & P. Sur., T-2-S, elev. 2,730 ft. ..... Drilling 2,780 ft.; 8-in. hole dry.

Marland Oil Co.'s No. 1-A Guitar Trust Est. ..... Drilling 315 ft.
Marland Oil Co.'s No. 1 A. G. Haines, C SE Sec. 20, Blk. 32, T. & P. Sur., T-1-N ..... Top salt 1,145 ft.; drilling 2,030 ft.; 10-in. hole dry.

Mays, Nixon & Flowers' No. 1 W. J. Flowers..... Location.
Peer Oil Corp.'s No. 1 Read, C NW Sec. 39, Blk. 30, T. & P. Sur., T-1-N ..... Fishing tools 525 ft.
Texon O. & L. Co. and Marland Oil Co.'s No. 1 Mrs. Connaly ..... Drilling 330 ft.
Texon O. & L. Co. and Marland Oil Co.'s No. 1 Mabel O. Quinn ..... Top lime 3,215 ft.; drilling 3,210 ft.; 8-in. hole dry.

HUDSPETH COUNTY

Lockhart Brothers' No. 1 Gardner & Moseley, C SE Sec. 5, School Blk. 21 ..... Shut down 235 ft.
Lockhart & Co.'s No. 1 Moore, C SE Sec. 16, Blk. 71, T. & P. Sur. T-6 ..... Rig.

IRION COUNTY

Cash Dollar et al's No. 1 G. J. Bird, NE Sec. 16, Blk. 10, S. P. R. R. Sur. ..... Shut down 2,500 ft.

JEFF DAVIS COUNTY

Humble O. & R. Co.'s No. 2 Crecencio Flores, 1,130 ft. N and 850 ft. E of SW cor. Sec. 34, Blk. 58, T. & P. Sur., Twp. 8 ..... Drilling 525 ft.

JONES COUNTY

Gibson & Johnson's (was Cole & Hart's) No. 1 Joe Dillard, NW cor. Sec. 2, Blk. 17, T. & P. Sur. ..... Drilling 1,040 ft.
Midwest Exploration Co.'s (was Campbell et al's) No. 1 L. H. Herndon, Sec. 6, M. E. P. & P. Sur., elev. 1,832 ft. ..... Top pay 2,498 ft.; deepening to 2,524 ft.; swabbed 115 bbls.; shut down for orders 3,009 ft.

Garland & Diamond's No. 1 E. D. Glynn, SE cor. Sec. 18, Deaf & Dumb Asylum Lands ..... Seven bailers salt water per hour at 1,465-1,500 ft.; hole full water 1,900-07 ft.; drilling 1,925 ft.

Hutson & Weaver's No. 1-A Smith, Sec. 51, Blk. 18, T. & P. Sur. ..... Shut down for fuel and casing 800 ft.

Marston Oil Co.'s No. 1 E. Howell, NW cor. SE W ½ of N 400 acres, Sec. 20, Blk. 19, T. & P. Sur. ..... Small show oil 2,496 ft.; shut down 2,545 ft.

Marston Oil Co.'s No. 1 J. S. Swan, Robert Spears Sur. No. 280 ..... Hole full salt water 2,390-2,400 ft. and 2,435 ft.; hole full salt water 2,015-20 ft.; shut down 3,503 ft.

W. G. Stough and others' No. 1 J. P. Willis, J. C. Patterson Sur. No. 2 ..... Fishing tools 1,740 ft.
Stebbins Oil Co.'s No. 2 Higgs, SE cor. Sec. 30, W. T. Scott Sur. ..... Location.
Stebbins Oil Co.'s No. 1 Scott ..... Moving in rig.
Swensondale Oil Co.'s No. 1 Caton, SW NW Sec. 9, Deaf & Dumb Asylum Lands ..... Shut down 2,505 ft.

KENT COUNTY

Marland Oil Co. and Texon O. & L. Co.'s No. 1 Bilby, Sec. 41, Blk. K, Thompson Sur. ..... Location.

KNOX COUNTY

Deep Rock Oil Co.'s No. 1 Beavers, CSL Sec. 224, Blk. 44, elev. 1,441 ft. ..... Total depth 2,865 ft.; rig rebuilt.
Deep Rock Oil Co.'s No. 1 Big Four, 1,270 ft. S and 2,590 ft. W of NE cor. Sec. 31, Blk. 4 ..... Drilling 2,090 ft.
Humble O. & R. Co.'s No. 1 Goode, 1,940 ft. S and 200 ft. W of NE cor. Sec. 7, H. T. & B. Sur. ..... Hole full water 1,710-15 ft., and 2,760-2,800 ft.; drilling 3,176 ft.

The Texas Company's No. 1 J. O. Bowden, Sec. 115, Blk. 45, H. & T. C. Sur. ..... Lime 1,240-45 ft.; estimated 100,000 ft. gas; hole full water 1,835 ft.; pipe stuck at 2,130 ft.
The Texas Company's No 1 Teague ..... Drilling hard lime 2,650 ft.

LOVING COUNTY

Kingwood Oil Co.'s No. 1 T. O. Moore, C NE Sec. 2, Blk. B-25, Public School Land, elev. 3,120 ft. ..... Top salt 1,210 ft.; show gas 1,600-15 ft.; 800 ft. sulphur water from 4,020-25 ft.; drilling 4,375 ft.

Owens & Sloan's No. 1 W. D. Johnson, C SE Sec. 20, Blk. 53, T-2, T. & P. Sur., elev. 2,934 ft. ..... Shut down 1,020 ft.; in litigation.

LYNN COUNTY

Elpo Oil Co.'s No. 1 Nevols, NW cor. Sec. 6, Blk. C-42, School lands ..... Rotary; drilling 120 ft.
The Hart Oil Corp.'s No. 1 C. O. Edwards, NW NW Sec. 5, Blk. 2, L. & S. V. Sur. ..... Shut down 1,400 ft.

MIDLAND COUNTY

Orbit Oil Co.'s No. 1 Moreland, C SE Sec. 17, Blk. 39, T. & P. Sur. T-1-S ..... Shut down 185 ft.

MITCHELL COUNTY

Robert Thraves' No. 1 C. Way, Sec. 91, Blk. 27, T. & P. Sur. T-1-N ..... Total depth 2,508 ft.; fishing tools.
Tex-O-Kan Oil Co. and Robert Thraves' No. 1 W. F. Sanders ..... Drilling 3,140 ft.

B. E. Walter et al's No. 1 J. E. Dollen, NW cor. SW Sec. 11, Blk. 27, T. & P. Sur. ..... Shut down 2,955 ft.; hole full sulphur water.

NOLAN COUNTY

J. H. Winemiller Corp.'s (was Peters et al's) No. 1 Booth, Sec. 90, Blk. 21, T. & P. Sur. ..... Shut down for orders at 3,212 ft., contract depth.
Herbert Oil Co.'s (was McClesky and others') No. 1 Pepper, SE cor. SW Sec. 29, Blk. 22, T. & P. Sur. .... Rigged up and shut down.
Zweifel and others' No. 1 Longbotham, C SE Sec. 130, Blk. 1, H. & G. N. Sur. ..... Drilling 3,485 ft.

PECOS COUNTY

George Anderson et al's No. 1 McKenzie, C SE N half Sec. 6, Blk. 604 ..... Drilling 615 ft.
George Anderson's No. 1 Sherbine Brothers ..... Rig on ground.
Allsman & Bell's No. 3 Pecos River bed ..... Location.
Benedum & Trees' No. 1 J. C. Trees, C NW SE SE Sec. 30, Blk. 7, H. & G. Sur., elev. 2,556 ft. ..... Flowed sulphur water 3,250 ft.; shut down 3,460 ft.

Buell et al's No. 1 Batchelor, C N ½ NE Sec. 89, Blk. OW, G. C. & S. F. Sur., elev. 2,188 ft. ..... Show oil 1,700 ft.; flowed sulphur water 1,775 ft. and 2,800 ft.; shut down 2,820 ft.

Buell & Hagan's No. 1 Jasper, 1 mi. S and W NE cor. Jasper Co. School Land No. 104 ..... Top salt 1,527 ft.; drilling 2,125 ft.
California Co.'s No. 2 Yates, Sec. 34, Blk. 194 ..... Rig.
California Co.'s No. 3 Yates, Sec. 34, Blk. 194 ..... Drilling 285 ft.
California Co.'s No. 4 Yates, Sec. 34, Blk. 194 ..... Rigging up.
California Co.'s No. 5 Yates, Sec. 34, Blk. 194 ..... Building rig.
California Co.'s No. 1 M. A. Smith ..... Brown sand 630 ft.; cleaning out.
California Co.'s No. 2 M. A. Smith ..... Rigging up.
Douglas Oil Co.'s No. 1 J. T. Selman ..... Spudding 100 ft.
M. C. Dibble & Hale's No. 1 Bonebrake, Sec. 115, Blk. 8, I. & G. N. Sur. ..... Cleaning out 560 ft.
Bob Elmore's No. 1 M. Holmes, Sec. 542, Blk. 1, I. & G. N. Sur., elev. 2,176 ft. ..... Top salt 335 ft.; slight show oil and 2 bailers sulphur water 1,500 ft.; small show gas at 1,515 ft.; drilling 1,785 ft. (corrected).

Garland & Mott's No. 1 El Paso Cattle Loan Co., C NE Sec. 26, Blk. 126, T. & S. L. Sur., elev. 2,562 ft. ..... 200 ft. of sulphur water at 2,530 ft.; underreaming 6-in. 2,645 ft., total depth.

Gulf Production Co.'s No. 1 Smith, NE cor. Sec. 28, Blk. 194, elev. 2,641 ft. ..... First oil 1,263 ft.; drilling 1,282 ft.; oil rising in hole.
George A. Henshaw et al's No. 1 B. T. Corder ..... New location.
George A. Henshaw, Jr., No. 1 Snyder, Sec. 29, Blk. 144, T. & St. L. Sur. ..... Drilling 425 ft.
Humble O. & R. Co.'s No. 1 M. A. Smith, NE cor. Sec. 36, Blk. 194, G. C. & S. F. Sur. ..... Cementing 8-in. 940 ft.
Kirby Oil Co.'s No. 1 W. W. Turney, NW cor SW Sec. 11, Blk. 140, T. & St. L. Sur. ..... New location.
Mazda Oil Co. and Savoy Oil Co.'s No. 1 Smith, Sec. 24, Blk. 194, G. C. & S. F. Sur. ..... Running 10-in. 655 ft.

zda Oil Co. and Savoy Oil Co.'s No. 2 Smith, Sec. 24, Blk. 194, G. C. & S. F. Sur. — Location.
cMan and Marland's No. 2 I. G. Yates — Fishing 555 ft.
McMan and Marland's No. 3 I. G. Yates — Drilling 650 ft.
McMan and Marland's No. 4 I. G. Yates — Drilling 690 ft.
McMan and Marland's No. 5 I. G. Yates — Drilling by tools 435 ft.
McMan and Marland's No. 6 I. G. Yates — Drilling 370 ft.
Mid-Kansas and Transcontinental Oil Co.'s No. 2 Smith-Taylor — Drilling 540 ft.
Mid-Kansas and Transcontinental's No. 3 Smith-Taylor, S. c. 33, Blk. 194 — Building road.
Mid-Kansas and Transcontinental's No. 1 Mrs. M. A. Smith — Shut down for water 36 ft.
Mid-Kansas and Transcontinental's No. 4 Yates-B — Location.
Mid-Kansas and Transcontinental's No. 8 Yates-A — Shut down for water 200 ft.
Moody Oil Corp.'s No. 1 B. T. Corder — Location.
Olean Petroleum Co.'s No. 1 G. N. Harral — Total depth 673 ft.; straightreaming.
Quinby Oil Co.'s No. 1 Townsite, Sec. 1, Blk. 267, Client Addition Sur. Fort Stockton, elev. 2,980 ft. — Shut down 3,440 ft.
Quinby Oil Co.'s No. 2 Bennet, C NW 592, Blk. 105, G. C. & S. F. Sur., elev. 2,560 ft. — Shut down 1,457 ft.
Quinby Oil Co.'s No. 1 A. A. Gray, 660 ft. N and 1,320 ft. E. SW cor. Sec. 593, Abst. 3,009 — Shut down 700 ft.
Red Bank Oil Co.'s No. 1 McKenzie, C N ½ Sec. 21, Blk. 126, T. & St. L. Sur., elev. 3,256 ft. — Show sulphur water 2,641 ft.; hole full sulphur water at 2,600 ft. and 2,761-80 ft.; plugging at 3,512 ft.
Red Bank Oil Co.'s No. 2 M. A. Smith, Sec. 24, Blk. 194 (330 ft. S of No. 1) — New location.
Roxana Petroleum Corp.'s No. 1 Smith-A, Sec. 27, Blk. 194 — Drilling 595 ft.
Roxana Petroleum Co.'s No. 1 J. H. Tippett — Cleaning out 650 ft.
W. R. Shankel et al's No. 1 I. G. Yates, CSL SW SE SE Sec. 58, Blk. 1, I. & G. N. Sur., elev. 2,220 ft. — Top salt 425 ft.; 40 ft. oil 1,313 ft.; sulphur water 1,478-79 ft.; water plugged off; shut down.
Simms Oil Co.'s No. 1 M. A. Smith, SW cor. Sec. 103, Blk. 194 — Drilling 1,040 ft.
Simms Oil Co.'s No. 2 A. J. Devlin — Drilling 1,100 ft. anhydrite.
Transcontinental Oil Co.'s No. 1 Blackstone & Slaughter, Sec. 29, Blk. 129, F. St. L. Sur. — Fishing tools 820 ft.
World Oil Co.'s No. 1 Kloh, Sec. 47, Blk. 48, Township 8, T. P. R. R. Sur. — Rig on ground.
World Oil Co.'s No. 1 Serf, SW cor. NE Sec. 10, Blk. 130, T. & St. L., elev. 3,245 ft. — Location.

PRESIDIO COUNTY

Headlock & Miller's No. 1 Tootle est., Sec. 123, Blk. 3, D. & P. Sur., elev. 2,912 ft. — Salt water 2,610 ft.; running 5-in. at 2,855 ft.; total depth 2,910 ft.; underreaming 5-in.
Pinto Canyon Oil Co.'s No. 1 Fields, 1,760 ft. S & E NW cor. Sec. 74, Blk. 2, D. & P. Sur. — Location.

REAGAN COUNTY

Henshaw & Camp's No. 1 University, Sec. 14, Blk. 49, University Land, elev. 2,772 ft. — Shut down for casing 200 ft.
Texon O. & L. Co.'s No. 1-B University, Group 1 — Top pay 6,284 ft.; shut down for motor 6,590 ft. with 3,800 ft. of 38.7 gravity oil in hole.
Marland Oil Co.'s No. 1 University-Anderson, Sec. 19, Blk. 58, University Land — Location.

REEVES COUNTY

Exploration Co.'s No. 1 A. A. Kinney, 1,500 ft. W. of NE cor. Sec. 26, Blk. C-18, Public School Land — Spudded 20 ft. and shut down.
David R. Thompson's No. 1 A. A. Eddins — Fishing for bit 1,142 ft.
World Oil Co.'s No. 1 Biggs, C SE Sec. 65, Blk. 112, Public School Land Sur., elev. 3,068 ft. — Shut down 1,610 ft.; tools moved to No. 1 Duff.
World Oil Co.'s No. 1 Duff, elev. 2,753 ft. — Drilling 4,020 ft.

RUNNELS COUNTY

Alworth et al's No. 1 E. A. Werner — Rig.
Lou Ladd & C. E. Sillix et al's No. 1 R. M. McMillan — Top pay 2,545 ft.; 6-in. set at 2,420 ft.; fishing for bailer; 60 ft. cavings in hole; will clean out and set liner.
Kennedy et al's No. 1 J. E. Tally — Rigging up cable tools.
Miles Oil Co.'s No. 1 L. S. Lawhon, NE cor. Sec. 68, — New location; drilling 600 ft.
Noble O. & G. Co.'s No. 1 Sims, Sec. 12, J. J. McHenry Sur. — Fishing tools 2,100 ft.
Owenwood Oil Corp.'s No. 1 H. B. Fowler — Location.

SCHLEICHER COUNTY

Beavers & Leath et al's No. 1 J. A. and W. T. Whitten, C NW Sec. 35, Blk. 11, T. C. Sur. — Shut down 400 ft.
Thomas Grey et al's No. 1 Ball Robinson, C NW Sec. 25, Blk. M, G. H. & S. A. Sur. — Sulphur water 2,125 ft.; hole full water 2,160-80 ft.; drilling 2,685 ft.

STERLING COUNTY

Orr et al's No. 1 Neal Reed, CNL Sec. 15, Blk. 30, W. & N. W. Sur. — Shut down 1,390 ft.

STONEWALL COUNTY

Peer Oil Corp. and Producers Oil Co.'s (was J. P. Johnson's) No. 1 R. P. Morrow — Drilling 1,970 ft.

TAYLOR COUNTY

A. J. Brown et al's No. 1 Henslee, NE cor. Sec. 5, Blk. 4, S. P. R. R. Sur. — Drilling 2,005 ft.
Dorning & Perrine's No. 1 J. A. Hammer, C N 100 acres, Sec. 23, Blk. 19, T. & P. Sur., elev. 1,904 ft. — Shut down 455 ft.
Gilbert Johnson's No. 1 C. M. Brown, Sec. 1, Blk. 6, T. & P. Sur. — Spudded and shut down.
Owen & Sloan's No. 1 Lattimer, Sec. 14, Blk. 9, T. & P. Sur. — Straightreaming 6-in. 2,605 ft.
Roeser & Pendleton's No. 1 Sam Hutman, C W ½ NW Sec. 64, Blk. 5, T. & P. Sur. — Water sand 2,222 ft.; drilling 2,272 ft.

TERRY COUNTY

Kingsland Oil & Potash Co.'s No. 1 Brownsfield, C NW SW SW Sec. 7, Blk. 1-A, E. L. & R. R. Sur. — Slight show gas 2,230 ft.; drilling 2,605 ft.

TOM GREEN COUNTY

George Amery's No. 1 Wilkey, C SW Sec. 3, B. A. L. Sur. — Location.
Dullahan et al's No. 1 Jacobs, Sec. 1,011, H. E. & W. T. Sur. — Shut down for orders 632 ft.
Fitzgerald et al's No. 1 Bennett — Shut down for casing 1,250 ft.
Tulsa Oil Co.'s No. 1 Adams, C SW Sec. 162, Blk. 11, S. P. R. R. Sur. — Shut down 735 ft.

UPTON COUNTY

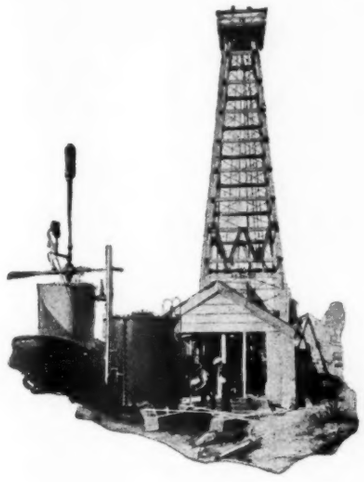
Mark Curtis et al's (was Hultz et al's) No. 2 Giddings, 5,336 ft. S and 6,678 ft. E of NW cor. Throckmorton Co. School Land, League 1 — Spudded and shut down.
J. M. Hickey's No. 1 W. I. Gormley, 1,650 ft. from SW and SE lines Sec. 7, Blk. 36, H. & T. C. Sur. — Top salt 472 ft.; set 5-in. 1,775 ft.; **small show gas.**
Wise & Jackson's No. 1 J. H. Porter, SW cor. SW SW Sec. 184, Blk. E — Top salt 1,370 ft.; top lime 3,349 ft.; top pay 3,419 ft.; total depth 3,517 ft.; shot 150 qts. at 3,414-3,508 ft.; 300 ft. oil in hole before shot; now 900 ft. sulphur water and 300 ft. oil; shut down.

VAL VERDE COUNTY

A. Blume et al's No. 1 Moore est., Sec. 183, J. Mitchell Sur., elev 953 ft. — Shut down 3,000 ft.
Curso Williams' No. 1 Holman, NE NE Sec. 5, Blk. N, G. H. & S. A. Sur. — Shut down 2,940 ft.
Douglas Oil Co.'s No. 1 Sellars, C SE Sec. 82, Blk. A, I. & G. N. Sur. — Shut down 3,010 ft.
East Del Rio Oil Co.'s No. 1 Russell, SE cor. Sec. 183, Del Rio Town Sur. — Total depth 3,190 ft.; cleaning out.
Hiawatha Oil Co.'s No. 1 Sellars, C Sec. 1,031, Blk. A, I. & G. N. Sur. — Hole full salt water 2,455 ft.; shut down 3,503 ft.
Magnolia Petroleum Co.'s No. 1 Whitehead, Sec. 81, D. G. C. & S. F. Sur., elev. 1,770 ft. — Set 6-in. 3,525 ft.; drilling 3,570 ft.
Independent Operators' No. 1 Whitehead, SE SE Sec. 30, Blk. 4, I. & G. N. Sur., elev. 1,175 ft. — Shut down 3,900 ft.
O. O. Owens' No. 1 Mills, Sec. 128, Blk. 1, I. & G. N. Sur., elev. 2,130 ft. — Gas sand 2,491-2,520 ft.; tested 125,750 ft. gas; reset 8-in. 2,511 ft.; shut down 2,801 ft.

WINKLER COUNTY

Amerada Petroleum Corp.'s No. 1 J. B. Walton, SW cor. NW Sec. 48, Blk. 26 — Moving in rig and building road.
Atlantic O. P. Co.'s No. 1 Ida Hendricks, SE cor. W ½ NE Sec. 44, Blk. 26 — Drilling 650 ft.
Atlantic O. P. Co.'s No. 1 Hendricks, Sec. 34, Blk. B-5, elev. 2,823 ft. — Cemented 6-in. at 2,548 ft.; shut down 2,522 ft.
V. T. Bolin's No. 1 Ida Hendrick, C SE NE Sec. 4, Blk. B-5 — Location.
Cranfill Brothers' No. 1 M. J. Bashara, at cor. Secs. 10, 11, 22 and 23, School Blk. 77 — Drilling 300 ft.
Cranfill & Reynolds' No. 1 Ida Hendrick, C SW NW NW Sec. 28, Blk. B-5 — Top salt 1,290 ft.; cemented 8-in. 2,247 ft.; standardizing.
Cranfill & Reynolds' No. 2 Ida Hendricks — Rigging up rotary.
Group 1 Humble O. & R. Co.'s No. 1 T. G. Hendricks, C SE Sec. 36, Blk. 27, elev. 2,823 ft. — Running 6-in. 2,500 ft.
Humble O. & R. Co.'s No. 1 T. G. Hendricks, NW cor. NE Sec. 43, Blk. B-5, Public School Land, elev. 2,816 ft. — Pocket of gas at 2,500 ft.; blew tools out through rig; estimated 5,000,000 ft. gas; shut down 2,756 ft.; gas increased from 8,000,000 to 15,000,000 ft.; blew tools up in hole; stuck in pipe; trying to kill gas to fish bit.
Humble O. & R. Co.'s No. 2 T. G. Hendricks, SE cor. NE Sec. 34, Blk. B-5 — Cemented 8-in. 2,230 ft.
Independent O. & G. Co.'s No. 1 J. S. Howe-D, NE cor. W ½ SE Sec. 44, Blk. 26 — Drilling 377 ft.
Independent O. & G. Co.'s No. 1 Hendricks-A, elev. 2,816 ft. — 250,000 ft. gas 2,555-75 ft.; set 8-in. 2,595 ft.; shut down 2,601 ft. (steel line measurement).
Independent O. & G. Co.'s No. 2 Hendricks-A, elev. 2,822 ft. — Cemented 6-in. at 2,475 ft. and shut down at 2,504 ft. (steel line measurement).
Liner Drilling Co.'s No. 1 Seth-Campbell, NE cor. Sec. 2, Blk. B-5 — Moving in rotary tools.
Landreth Prod. Corp.'s No. 1 Grisham-Hunter, SW cor. SW NW Sec. 45, Blk. 26, School Land — Rotary; cemented 6-in. 2,560 ft.
Landreth Prod. Corp.'s No. 2 Grisham-Hunter, SE cor. W ½ NW Sec. 45, Blk. 26 — Shut down for water 1,206 ft.
Landreth Prod. Corp.'s No. 1 Hendricks, SE cor. SW Sec. 29, Blk. B-5 — Drilling 1,190 ft.
Marland Oil Co.'s No. 1 Grisham-Hunter — Location.
Marland Oil Co.'s No. 2 Grisham-Hunter — Building rig.
Marland Oil Co.'s No. 3 Grisham-Hunter — Building rig.
Marland Oil Co.'s No. 4 Grisham-Hunter — Location.
Mining & Engineering Co.'s No. 1 T. G. Hendricks, Sec. 10, Blk. B-12 — Spudded and shut down.
R. S. Matthews et al's No. 1 State, C Sec. 7, Blk. A-57, Public School Land Sur., elev. 3,120 ft. — Top salt 1,623 ft.; shut down 3,500 ft.; contract completed.
Murchison Oil Co., Cranfill Brothers and Marland's No. 1 Grisham-Hunter, NW cor. SW Sec. 35, Blk. B-5 — Flowed 195 bbls. per hour at 2,633-55 ft. with 500 lbs. back pressure; opened 3 p. m. Sept. 17 and flowed 1,500 bbls. in 16 hours.
Murchison Oil Co. and Cranfill Brothers' No. 2 Grisham-Hunter — Moving in rig.
Murchison Oil Co. and Cranfill Brothers' No. 3 Grisham-Hunter — Building rig.
Murchison Oil Co. and Cranfill Brothers' No. 4 Grisham-Hunter — New location.
Murchison Oil Co. and Cranfill Brothers' No. 1 Grisham-Hunter-B — Moving in rotary.
Pure Oil Co.'s No. 2 Hendricks, elev. 2,827 ft. — Top salt 1,518 ft.; top lime 2,390 ft.; made 20-bbl. head at 2,635-43 ft.; shut in.
Pure Oil Co.'s No. 1 Hendricks-B, NE cor. SE, Sec. 34, Blk. B-5 — Rotary; top salt 1,395 ft.; top lime 2,276 ft.; cemented 8¼-in. at 2,284 ft.; standardizing.
Pure Oil Co.'s No. 2 Hendricks-B — Top salt 1,295 ft.; drilling 1,300 ft.
Pure Oil Co.'s No. 3 Hendricks-B — Location.
Republic Prod. Co.'s No. 1 Grisham-Hunter-A, NW cor. E ½ SW Sec. 45, School Block 26 — Drilling 860 ft.
Republic Prod. Co.'s No. 1 Grisham-Hunter-B, SW cor. E ½ SE Sec. 41, Blk. B-5 — Top salt 1,300 ft.; drilling 1,475 ft.
Roxana Petroleum Corp.'s No. 1 Grisham-Hunter-A, SW cor. E ½ NW Sec. 45, School Block 26 — Fishing 1,550 ft.
Roxana Petroleum Corp.'s No. 1 Grisham-Hunter-B, SW cor. S ½ SE Sec. 29, Blk. B-5 — Top salt 1,330 ft.; drilling 2,060 ft.
Roxana Petroleum Corp. and Llano Oil Co.'s No. 1 Scarborough, C Sec. 1, Blk. C-22, Public School Land, elev. 2,921 ft. — Top salt 1,115 ft.; hole full water 1,321 ft.; 10-in. set 1,570 ft.; top pay 2,990 ft.; second pay 3,124-28 ft.; swabbed 115 bbls. July 17; total depth 3,447 ft. (steel line measurement), sulphur water; plugged back to 3,347 ft.; raised pipe to 2,975 ft.; shot with 200 qts. 3,120-3,300 ft.; hole caved in on top of tools; fishing.
Southern Crude Oil Pur. Co.'s No. 3-C Hendricks, SE cor. NE Sec. 33, Blk. B-5, elev. 2,816 ft. — Top salt 1,870 ft.; little gas 2,630-40 ft.; shut down for orders 2,735 ft.; making 2,000,000 ft. gas and 1 bbl. oil; top lime 2,630 ft.
Southern Crude Pur. Co.'s No. 4-C Hendricks — Cemented 8-in. 2,525 ft.; small show oil and gas 2,660-65 ft.; gas increased 2,689-90 ft.; estimated 3,000,000 ft. gas 2,720 ft.; 1½ bbls. oil 2,735-40 ft.; shut down.
Southern Crude Oil Pur. Co.'s No. 1 T-88 Hendricks-B-2 — Rig on ground.
Southern Crude Oil Pur. Co.'s No. 1-F Hendricks, Sec. 33, Blk. B-5, NE cor. SE — Cemented 6-in. 2,529 ft.; standardized and shut down.
Southern Crude Oil Pur. Co.'s No. 1 T-89 Grisham-Hunter-A, CWL NE SW Sec. 35, Blk. B-5 — Top salt 1,219 ft.; top lime 2,295 ft.; straightening hole 2,340 ft.
Texon O. & L. Co.'s No. 2 Grisham-Hunter-A — Drilling 330 ft.
Texon O. & L. Co.'s No. 1 Grisham-Hunter-B, NW cor. W ½ SW Sec. 45, School Block 26 — 15-in. casing froze 150 ft.
Texon O. & L. Co.'s No. 2 Grisham-Hunter-B — Rigged up and shut down.
White Eagle O. & R. Co.'s (was Gibson & Johnson's), No. 1 R. A. Lock, 1,320 ft. W of NE cor. Sec. 30, Blk. 74, NW of discovery well, elev. 2,830 ft. — Drilling 1,970 ft.
Southern Crude O. P. Co.'s No. 3 T-67 Hendrick-A, C SW NW NE Sec. 4, Blk. B-12 — Top salt 1,540 ft.; cementing 6-in. 2,619 ft.
Southern Crude Oil Pur. Co.'s No. 3 T-67 Hendricks-A-2 — Building rig.
Southern Crude O. P. Co.'s No. 1 T-67 Hendrick-B, NE cor. SE Sec. 44, Blk. 26 — Junked hole 1,000 ft.; skidded 40 ft. south; drilling 1,540 ft.
Tidal Oil Co.'s (was L. D. Ladd et al's) No. 1 J. W. Amburgey, C Sec. 24, Blk. B-7, Public School Land — Fishing tools 4,002 ft.
Southern Crude O. P. Co.'s No. 2 T-68 Grisham-Hunter-A, SW cor. W ½ NW Sec. 35, Blk. B-5 — Top salt 1,365 ft.; top lime 2,308 ft.; cementing 6-in. 2,313 ft.
Southern Crude O. P. Co.'s No. 1 T-88 Ida Hendricks-C, NW cor. Sec. 28, Blk. B-5 — Top salt 1,255 ft.; drilling 1,670 ft.



STANDARDIZATION
In Well Bit and Jar Steels

WHEN the first well was drilled in this country sixty-eight years ago—the Drake Well in Pennsylvania—the industry may be said to have taken its first step towards standardization, for the pioneer drillers selected Crescent, the Hammered Bit and Jar Steels which have since become practically the standard of the industry.

Through the rank and file—from driller and dresser to superintendent and executive—Crescent Hammered Bit and Jar Steels are recognized as the steels that **keep their gauge longer, make more hole in less time and require fewer re-dressings.**

Today, Crescent Hammered Bit and Jar Steels are even better than ever—they are sound and dense, free from defects and high in steel quality. They merit standardization wherever hole is made.

For lower drilling costs per foot, specify Crescent Hammered Bit and Jar Steels

CRESCENT HAMMERED BIT STEEL
furnished in all sizes, in plain sections, or with tong holds drawn to any diameter or taper.

CRESCENT HAMMERED JAR STEEL
furnished in all sizes with corners knocked down, nicked in center if desired, and to any length.

CRESCENT HAMMERED JAR CAPPING STEEL
furnished in all sizes, with corners broken down. Readily welded and heat-treated.

CRUCIBLE STEEL COMPANY OF AMERICA

General Offices: 17 East 42nd St., New York, N. Y.

BRANCH OFFICES AND WAREHOUSES

Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Hartford, Indianapolis, Milwaukee, New Haven, New York, Philadelphia, Pittsburgh, Providence, San Francisco, Seattle, Springfield, St. Louis, St. Paul, Syracuse, Montreal, Toronto, London, Tokio

Crescent Hammered Bit & Jar Steel

The GRAND MASTERS *had to be right . . .*

P & W OIL WELL GAGES

1. *Cable Drilling Tool Joint Gage.*
2. *Sucker Rod Master Gages.*
3. *Rotary Tool Joint Master Gages.*
4. *Casing Gages.*
5. *Tubing Gages—plain and upset.*
6. *Drill Pipe Gages.*

When the American Petroleum Institute wanted Grand Master Cable Joint Gages they selected Pratt & Whitney to make them. Extremely close tolerances were required. To Pratt & Whitney this delicate work was entrusted because our equipment for making fine measurements is unsurpassed anywhere in the world, and because of our reputation and experience as makers of fine gages.

The Grand Master Cable Joint Gages and reference gages of the same type for manufacturers' and operators' use were all made at the same time. We based our price on the number ordered.

Since then we have received an order for A. P. I. Sucker Rod Master Gages. Reference gages were made as before.

Now we are preparing to make Rotary Tool Joint Master Gages. The order is not closed as yet but will close October 15th.

If you manufacture equipment where such gages are used, or if you use them to check equipment purchased or repaired, get in touch with Pratt & Whitney Co. It would be to both your advantage and ours to make Oil Well Gages in large quantities. It is an opportunity for you to save if you act quickly.

PRATT & WHITNEY CO., *Hartford, Conn.*
Division Niles-Bement-Pond Company

Cable Drilling Tool Joint Gages

PRATT & WHITNEY

WILDCAT OPERATIONS IN PANHANDLE

(Continued from Page 64)

DONLEY COUNTY

A. T. Drlg. Co.'s No. 1 F. E. Harington, Sec. 39, Blk. 3-C ..... 1,200 ft. water, 3,115-22 ft; show gas, 3,140-60 ft; dry granite wash, 3,260-93 ft; S.D., 3,498 ft.

DICKENS COUNTY

Bowser Mickels et al's No. 1 Pitchford ranch, Sec. 1, Blk. 1, Sam Lazarus Sur. ..... S.D., 3,355 ft; cor. depth: T.A.

FLOYD COUNTY

Explto. Co.'s No. 1 S. H. Boone, C. C. H. Johnson Sur... Spudded and S.D.
Explto. Co.'s No. 1 Land & Cattle Co. ..... S.D., 780 ft. for orders.

GRAY COUNTY

Amogray Oil Co.'s No. 1 A. Chapman, SW NW SW, Sec. 9, Blk. 26, H. & G. N. Sur. ..... Drlg., 2,100 ft.
Atlantic O. P. Co.'s No. 1 Combs & Worley, NW cor. NE Sec. 39, Blk. 3 ..... T.D., 3,085 ft; shot 560 qts., 2,947-3,052 ft; sprayed 30 bbls. 24 hrs. and went dead; T.D., 3,165 ft; 6-in set, 3,150 ft; to plug back.
Archer, Blake et al's No. 1 Turneau, Sec. 111, Blk. 2-B.. Spudded and S.D; temp. abd.
Amos et al's No. 1 Crews, NW cor. Sec. 9, Blk. 25 ..... Shot with 300 qts., 2,720-2,815 ft; T.D., 3,005 ft., bridged and spraying 10 bbls. per day; installing pump.
Bay Shore Oil Co.'s No. 1 C. W. Bradford, Sec. 143, Blk. 2-B ..... Killed gas, fish. for bit, 2,668 ft.
British American Oil Co.'s No. 1 J. M. Patton, Sec. 61, Blk. B-2 ..... Rigged and S.D.; temp. abd.
Camel Oil Co.'s No. 1 Harrah, Sec. 163, Blk. 3, I. & G. N. Sur. ..... Drlg., 1,060 ft.
Cole O. & G. Co.'s (was Magdalene Oil Co.'s) No. 1 J. E. Williams, Sec. 17 Blk. 1 ..... S.D., 3,860 ft.
Danciger et al's No. 1 Jackson, NW cor. Sec. 88, Blk. B-2 Set 8-in., 2,477 ft; show gas, 2,530-2,695 ft; 10,000,000 ft. gas, 2,682-2,800 ft; drlg., 2,825 ft.
Delaney et al's No. 1 Jackson NW cor. E ½ SW, Sec. 88, Blk. B-2 ..... 8,000,000 ft. gas, 2,515-80 ft; run 6-in., 2,790 ft.
Donley Gray Oil Co.'s No. 1 J. W. Gordon, Sec. 79, Blk. 3 ..... Drlg., 3,010 ft.
Jack Doyle's No. 1 D. W. Osborne, SE cor. Sec. 109, Blk. 3 ..... Rig.
Edwards et al's No. 1 E. J. Case, NE cor. Sec. 182, Blk. B-2, H. & G. N. Sur. ..... Cmt. 12-in., 1,340 ft; S.D., 2,040 ft; U.R., 10-in.
Empire G. & F. Co.'s No. 1 Sarah George, Sec. 151, Blk. 3, I. & G. N. Sur. ..... Drlg., 710 ft.
Empire G. & F. Co.'s No. 1 I. B. Hughey ..... To drill deeper from 3,225 ft.
Gibson Oil Co.'s No. 1 Bowers, Sec. 92, Blk. B-2 ..... 2,500,000 ft. gas, 2,560-2,675 ft; 30,000,000 ft. gas, 2,780 ft; T.D., 2,810 ft; cmt. 8-in.
Gladis Gray's No. 1 Colebank-Morse (was Foster et al's No. 1 G. Cutebank), SW cor. NE Sec. 65, Blk. 25 ..... 2,905 ft., T.D; plugged back to 2,803 ft; shot 160 qts. 2,430-2,510 ft; 1.2 ft. oil in hole; bailed dry; shot 600 qts., 2,179-2,525 ft; C.O; swabbing 25 bbls. daily.
Gulf Prod. Co.'s No. 1 Bowers, Sec. 89, Blk. B-2 ..... 85 bbls. at 2,970 ft.
Gray County Pet. Co.'s No. 1 Herndon, Sec. 147, Blk 3 .... Hole full salt water, 3,420 ft; S.D., 3,670 ft; no show oil or gas.
Lefors Pet. Co.'s No. 1 Leach, Lefors Townsite ..... Drlg., 1,620 ft.
H. C. McCauley et al's No. 1 J. Morse ..... New loc.; rig on ground.
Magnolia Pet. Co.'s No. 1 Archer ..... Drlg., 3,065 ft; 6,000,000 ft. gas.
Magnolia Pet. Co.'s No. 1 H. Heitholt ..... C.O, 3,288 ft.
Midwest Explto. Co.'s No. 1 J. A. Hood, SE cor. SW, Sec. 33, Blk. 3, I. & G. N. Sur. ..... T.D., 3,044 ft; swabbed 28 bbls. in 3 hrs; C.O. to deepen.
Neudigate et al's No. 1 A. Chapman, NE cor. E half SE Sec. 52, Blk. 25 ..... 500,000 ft. gas, 2,760-65 ft; rainbow of oil, 2,820-25 ft; salt water; granite wash, 2,827-28 ft; S.D., 2,835 ft.
Operators Oil Co.'s No. 1 Jackson ..... New loc.; rig.
Operators Oil Co.'s No. 1 Bowers, NE cor., Sec. 35, Blk. 3, I. & G. N. Sur. ..... Run. 8-in., 2,615 ft; 2,000,000 ft. gas.
Pampa O'l Co.'s No. 1 W. R. Campbell, Sec. 90, Blk. 3 .. Drlg., 3,200 ft.
Pampa Pet Co.'s No. 1 Mary Leopold, Sec. 141, Blk. 3... Water, 3,230-60 ft; slight oil show in granite wash, 3,572-75 ft; S. D., 3,700 ft.
Purple Sage Oil Co.'s No. 1 Johnson, Sec. 8, Rockwell County School land ..... First oil show, 2,645 ft; water, 2,660 ft; show oil in gran. wash, 2,790-95 ft; 8-in. cas. set., 2,803 ft; show gas, 2,814 ft; shot 300 qts. at 2,646-94 ft; T.D., 3,208 ft; C.O.
Riley & Heck's No. 1 Mrs. Hopkins, Sec. 66, Blk. 2-B... Flow and swabbed 20 bbls. for week from gran. wash, 3,000-10 ft; T.D., 3,303 ft; S.L.M; may deepen.
Rensoul Pet. Co.'s (was Salisbury & Reynolds') No. 1 M. Huselby, C SE NE NE Sec. 55, Blk. 25, H. & G. N. Sur. ..... Flow, 40 bbls. daily from granite wash topped, 2,407 ft; drlg. granite wash, 2,845-53 ft, with small increase; shot with 400 qts., 2,695-2,780 ft and 150 qts. at 2,560-2,620 ft; C.O; will shoot again; T.D., 2,960 ft.
Navillus Oil Co.'s (was Sullivan et al's) No. 1 fee, NW cor. E ½ SW, Sec. 1, Blk. 1, A. C. H. & B. Sur. ... Drlg., 1,650 ft.
J. Williams et al's No. 1 C. W. Bradford, Sec. 123, Blk. B-2 ..... Rig; temp. abd.

HALE COUNTY

Donnell Pet. Co.'s No. 2 Mullican, NW cor. Sec. 66, Blk. A-3, I. & S. B. Sur. ..... Top pay in sandy shale, 405 ft; ½ bailer oil and 3 bailers water per day; S.D., 500 ft.
Donnell Pet. Co.'s No. 1 Mullican, C Sec. 21, Blk. B, R. M. Thompson Sur. ..... 200 ft. fluid in hole from 407-14 ft; S.D.
Exploration Co.'s No. 1 Crawford, cen. NE, Sec. 17, Blk. C-3, T. T. R. R. Sur. ..... Spud and S. D.
Exploration Co.'s No. 1 fee, C SE half Sec. 19, Blk. S-4, D. & S. E. Sur. ..... Rig; T.A.
Exploration Co.'s No. 1 Goodman ..... Spudded and S.D.
A. S. Mimm's No. 1 W. A. Ritcher, 700 ft. from east line and 1,200 ft. from south line, Sec. 17, Blk. X, John Glynn Sur. ..... Drlg., 375 ft.

HALL COUNTY

Seifert et al's No. 1 Owens, C NE Sec. 179, Blk. S-5, Dennison & Pacific Sur. ..... Spudded and S.D.

HANSFORD COUNTY

Oklavania et al's No. 1 Coots, Sec. 13, Blk. 45, H. & T. C. Sur. ..... S.D., 560 ft.

HOCKLEY COUNTY

World Oil Co.'s No. 1 Ellwood ..... S.D., 400 ft.

HARTLEY COUNTY

Deep Rock Oil Co.'s No. 1 Lymann & Balfour, Sec. 9 Blk. 2 ..... Show gas and rainbow of oil, 2,560 ft; top lime, 2,810 ft; 24,000,000 ft. gas, 3,100-3,280 ft; show oil, 3,648-50 ft; 3,653-75 ft, 150 ft. salt water; set 6- n. 3,642 ft; T.D., 3,765 ft; C.O. to deepen.
Ballck et al's No. 1 J. R. Irving, Sec. 13, Blk. 13..... Topped granite wash, 3,108 ft; show oil, 3,226 ft; drlg., 3,700 ft.
J. E. McKanna's No. 1 Frances Farwell, Sec. 30, Blk. 22.. T.D., 3,280 ft; rerun 6-in; S.D.
J. E. McKanna's No. 1 J. M. Shelton est., Sec. 29, Blk. 202 ..... S.D., 3,595 ft.

HEMPHILL COUNTY

Hoover et al's No. 1 Schaller est., Sec. 4 ..... Spudded and S.D.
Hoover et al's No. 1 fee, J. S. Hood Sur. ..... Run. 5-in. cas. to 4,555 ft; drlg., 4,730 ft.

HUTCHINSON COUNTY

Amarillo Oil Co.'s No. 1 Ida Ingerton, Sec. 41, Blk. 46, H. & T. C. Sur. ..... 70,000,000 ft. gas, 2,400-2,610 ft; run. 8-in. to 2,665 ft; show oil, 2,815 ft. in lime; drlg., 3,060 ft.
Anderson & Pritchard's No. 2 William Yake, SW cor. NW, Sec. 1, Blk. J, H. & G. N. Survey, half mile W of No .1 ..... Topped lime, 2,025 ft; set 8-in. at 2,030 ft; show gas, 2,495 ft; 400 ft. oil and water 2,778-88 ft; drlg., 2,792 ft.
R. G. Barnum et al's No. 1 Garland Sanford, Sec. 78, Blk. 46 ..... Rig.
Beam et al's No. 1 Cockrell, Sec. 3, Blk. 23 ..... S.D., 405 ft. for orders.
Big Coach Oil Co.'s No. 1 Dunnaway, Sec. 5, Blk. Y .... S.D., 750 ft.
Conklin et al's No. 1 Johnson, Sec. 1, Blk. X03, H. & O. B. Sur. ..... S D., 600 ft. for 12-in.
Great Plains Oil Co.'s No. 1 Bivins, Sec. 13, Blk. Y-2, T. T. R. R. Sur. ..... 60,000,000 ft. gas, 2,540-60 ft; fish., 3,190 ft.
Great Plains Oil Co.'s No. 1 Kingsland, Sec. 4, Blk. Y .. S.D., 2,400 ft.
Golden Eagle Oil Corp.'s No. 1 J. Q. Bost, Sec. 6, Blk. Y-2 ..... Spudded and S.D.
McMan O. & G. Co.'s No. 1 Albert Yake ..... Drlg., 1,800 ft.
Panfield Oil Co.'s No. 1 Luginbyhl Bros., Sec. 50, Blk M-23 ..... S.D., 1,200 ft.
Phillips Pet Co.'s No. 12 Elva-Whittenburg, E. Tomlinson Sur ..... Set 5-in., 4,323 ft; S.D. for orders, 4,445 ft.
Prairie O. & G. Co. and Vacuum O'l Co.'s No. 1 Cal Merchant ..... Drowning out 75,000,000 ft. gas, 2,252-2,740 ft; drlg. by tools, 2,550 ft.
Skyrocket Oil Co.'s No. 1 Mrs. R. A. Jameson ..... Fish., 2,519 ft.
Sweeney et al's No. 1 Johnson, Sec. 38, Blk. Y ..... Shut down, 1,720 ft.
The Texas Company's No. 1 Ellis Cockrell, Sec. 1, Blk. Y ..... Drlg., 3,475 ft.
Vitek Oil Co.'s No. 1 W. F. Allen, Jose Rodriguez Sur ... S.D., 180 ft.

KING COUNTY

California Co.'s No. 1 Spikes Farm No. 2 ..... Show of gas, 1,980-90 ft; 6 bailers salt water per hr., 2,085-90 ft, drlg., 3,025 ft.
Gibson & Johnson's No. 1 Burnett est. ..... Salt water, 2,525-50 ft; run. 8-in to 2,576 ft; drlg., 3,475 ft.
Humble O. & R. Co.'s No. 1 Pitchfork, Sec. 171, Blk. A-96, John H. Gibson Sur. ..... Drlg., 470 ft.
Midwests' No. 1 Patton ..... S.D., 3,002 ft. for clutch.
J. L. Pattison's No. 1 Patton ..... Slight show gas, 2,115-30 ft; S.D., 2,673 ft.
White Eagle's No. 1 Burnett estate ..... Drlg., 3,420 ft.

LAMB COUNTY

Tolbert & Simms' No. 1 Elwood, NE SW SW, Sec. 14, Blk. B., R. M. Thompson Sur. ..... Rigging up.

LIPSCOMB COUNTY

Cal-Tex's No. 1 Bradford, C NE NE Sec. 899, Blk. 43, H. & T. C. Sur. ..... Spudded and S.D.
Camp Creek Oil Co.'s No. 1 Mrs. H. D. May, Sec. 612, Blk. 43 ..... Shut down, 600 ft.
McCorkle's No. 1 A. Barton, NE cor. SW SE Sec. 504, Blk. 43, H. & T. C. Sur. ..... Water in lime at 4,126-40 ft; 6-in. set, 4,155 ft; S.D., 4,200 ft
Ozark Drlg. Co.'s No. 1 Frass, NE SE Sec. 106, Blk. 10, H. & T. C. Sur. ..... Rig on ground.
Smith, Kinsley & Ruby's No. 1 C. W. Jones, NE cor. SW, Sec. 100, Blk. 43 ..... Show oil, 3,520 ft; salt water at 3,900 ft; S.D.

LUBBOCK COUNTY

Center Oil Co.'s No. 1 Bowles ranch.. ..... Small show oil, 1,133-40 ft. in sand; S.D., 1,152 ft. (corrected)

MOORE COUNTY

A. O. Duggan's (was Shadler Bros.') No. 1 John Lowery, Sec. 237, Blk. 44 ..... Topped lime, 2,680 ft; set 8-in. at 2,770 ft; 4,000,000 ft. of gas, 2,980-3,020 ft; 15,000,000 ft. gas, 3,100-50 ft. (actual gauge); drlg., 3,280 ft.
Moore County Oil Co.'s No. 1 Sneed, Jr. ..... T.D., 3,351 ft; plugging back.
Prairie and Shamrock's No. 2 Gober, Sec. 16, Blk. M-21 Drlg., 1,300 ft.

MOTLEY COUNTY

Exploration Co.'s No. 1 Burleson ..... Spudded and S.D.
Exploration Co.'s No. 1 Tillson ..... S. D., 750 ft. for repairs.
Exploration Co.'s No. 1 Matador Land & Cattle Co., cen. SW, Sec. 37, John Gibson Sur. ..... Spudded and S.D.
Wheeler et al's No. 1 C. D. Bird, C NE Sec. 4, Blk. S, Stephens Sur. ..... Spudded and S.D.

OCHILTREE COUNTY

W. G. Burton's No. 1 Stickler, Sec. 579, Blk. 43 ..... Fish, 3 joints pipe, 3,940 ft.
Hamilton et al's No. 1 R. E. Wamble, Sec. 144, Blk. 43.. S.D., 250 ft.
McCorkle Pipe Line Co.'s No. 1 R. H. Moore, Sec. 471, Blk. 43 ..... S.D., 1,600 ft.
McCorkle's No. 1 Wemett, Sec. 674, Blk. 43 ..... S.D., 850 ft.
Standard Dec. Co.'s No. 1 Bowden, Sec. 923, Blk. 43 ... S.D., 900 ft.

OLDHAM COUNTY

Prairie O & G. Co.'s No. 1 Landegrin, SE cor. NE SW Sec. 46, League 310, Capital land ..... 1,900 ft. water, 4,085-93 ft; T.D., 4,518 ft; very small show oil, running 6-in.

PARMER COUNTY

Humble O. & G. Co.'s No. 1 Farwell; elev. 4,003 ft. ... Temp. abd., 3,600 ft.

POTTER COUNTY

Amarillo Oil Co.'s No. 1-B Masterson, Sec. 43, Blk. G-M-3, G. & M. Sur. ..... Drlg., 1,250 ft.

ROBERTS COUNTY

Big Bend Oil Co.'s No. 1 Mrs. H. Ledrick & Sons, Sec. 7, Blk. 5-A ..... Show gas, 4,990 ft; show oil, 4,992 ft; cas. set at 4,992 ft; S.D., 5,085 ft.
Murphy et al's No. 1 Gill, Sec. 31, Blk. M-2 ..... S.D., 650 ft.
Roco Oil Co., formerly Charles Page et al's No. 1 W. T. Hammon, Clay County school lands .... Spud. and S.D.
C. C. Wilson, No. 1 A. H. Tandy, NE cor. Sec. 182, Blk. 42, H. & T. C. Sur. ..... Spud. and S.D.

SHERMAN COUNTY

Gibson Oil Co.'s No. 1 Bivins, Sec. 35, Blk. 3-B..... Show gas, 2,015-25 ft; S.D., 2,140 ft.
Hagy & Harrington's No. 1 S. F. Flores, C SW Sec. 64, Blk. 3-T, T. & N. O. Sur. ..... Drlg., 2,900 ft; 8-in. at 2,726 ft.
Phillips Pet. Co. and Prairie O. & G. Co.'s No. 1 Price & Fuqua, C NE, Sec. 33, Blk. 2-B, G. H. & H. Sur.. Show gas, 2,105 ft; U.R., 2,215 ft

SWISHER COUNTY

Explto. Co.'s No. 1 W. C. Denwiddie ,Sec. 70, Blk. M-11, A. B. & M. Sur.; elev. 3,610 ft. ..... Rig on ground.

WHEELER COUNTY

Angus et al's No. 1 Vermillion, SW cor. NW SW, Sec. 80, Blk. 17, H. &. G. N. Sur. ..... T.D., 2,139; S.D. in granite; 10,000,000 ft. gas, 2,040-45 ft.
E. L. Arnold's No. 1 M. J. Williams ..... Drlg., 750 ft.
Foster et al's No. 1 S. H. McDonald, SE cor. NW SW, J. N. Lindsay Sur. ..... Spudded and S.D.
Hatcher et al No. 1 J. Hatcher, cen. NE SW Sec. 80, Blk. 23, H. & G. N. Sur. ..... Drlg., 280 ft.
Lyons et al's No. 1 Jackson, Sec. 11, Blk. 27, H. & G. N. Sur. ..... 1,100 ft. oil; granite wash, 2,290-2,300 ft; S.D. for storage.
Marland Oil Co.'s No. 2 W. E. Bentley ..... Show gas, 2,305 ft; S.D., by agreement.
Piney Oil & Gas Co.'s No. 1 M. E. Ackley, C NW NW Sec. 20, Blk. 24, H. & G. N. Sur. ..... Drlg., 775 ft.
Piney Oil & Gas Co.'s No. 1 W. S. Walker, Sec. 44, Blk. 24, H. & G. N. Sur. ..... Drlg., 2,260 ft; show gas.
Smith Brady et al's No. 1 P. J. Sorensen, Sec. 53, Blk. A-4 ..... S.D., 2,112 ft. for orders.
The Texas Company's No. 1 Bell, Sec. 71, Blk. 13, H. & G. N. Sur. ..... Gas 2,005 ft; swabbed 40 bbls. in 8 hrs. from granite wash, 2,145-55 ft; 1,000 ft. oil; drlg., 2,650 ft.
The Texas Company's No. 1 Morgan, Sec. 93, Blk. 17... Rigging up.
H. H. Vaughn's No. 1 Cuddeback ..... Drlg., 1,705 ft.

CONTACT FILTRATIONS OF OIL LUBRICANTS

(Continued from Page 56)

provided to weigh out a charge for the cooker. The charge to a cooker is 28,000 pounds and in treating the clay the cooker is first partly filled with water and the necessary amount of acid added (which is approximately one-half pound of 66 degree acid to a pound of net dry clay). The acid water of 20 per cent to 22 per cent acidity is heated with coils and live steam to 205 to 210 degrees and the clay added. It is agitated and cooked at 210 degrees temperature for eight to ten hours and the resulting pulp is then transferred to two wooden wash tanks; the tanks are of such capacity that half of the cooker batch leaves a considerable outage in each tank. Wash water is then added to the pulp and agitated with air, when it is allowed to settle and the supernatent liquid decanted off; washing is continued until the wash water contains less than 1 per cent acidity, usually obtained after three or four washes. It should be noted in connection with cooking the clay that any strength acid can be used as long as the pulp is brought to the required acidity.

Clay Impurities

In treating the clay, impurities, largely consisting of iron, lime and magnesia compounds, are removed and the clay particles left in a more porous nature so that maximum surface is presented in contact filtration; by weight the raw, dry clay loses about 16 per cent in treating.

The pulp contains about 70 per cent moisture and as all moisture is evaporated in the subsequent contacting operation, it is desirable to decant as much moisture from the pulp as possible. Wooden tanks are provided for this purpose and the pulp stored in them, the supernatent liquid being decanted off at intervals.

Many plants use an acid treated clay in contacting which has been dried and pulverized subsequent to treating. However, many experiments have demonstrated that such a clay is a more active decolorant in the pulp form. On this process water is decanted off to reduce the evaporative work on the heater, but the water content is still high enough to maintain full decolorizing value in the pulp.

Contact Operation

Returning to the contact operation. In the contact plant two vertical mixing tanks with cone bottoms are provided. A given amount of acid oil is pumped into a mixing tank and the required amount of pulp added to it, this required amount of clay being determined on a net dry clay basis in the laboratory from a test of the pulp storage. The oil and clay are then mixed thoroughly, in some cases through the use of air and in others by means of a pump, opinion differing as to the relative merits of these two methods.

A plunger type steam pump takes suction on the mixture of pulp and oil, and discharges to an evaporator which is connected in series with a pipe still. A centrifugal hot oil pump is provided, which takes suction on the cone bottom of the evaporator and discharges the mixture through the pipe still, the rate of circulation through the still being many times the rate of acid oil pulp charged to the evaporator.

The evaporator is maintained at approximately 400 degrees Fahrenheit, and the water and acid evaporated, the vapors being removed by means of a jet condenser. This evaporation before circulating the pipe heater eliminates erosion and overheating of the tubes in the still over what it would be if the mixture was simply heated in the pipe still and discharged to the evaporator. The mixture is heated to between 400 and 500 degrees Fahrenheit, the temperature having an important bearing on the decolorizing effect of the clay. It is also true that proper temperature varies for different clays and different oils. The hot mixture is continuously purged from the evaporator heater coil circuit and pumped through a water cooled coil; at the end of this coil naphtha is introduced primarily to cut the viscosity of the cylinder stock and permit filtering at a relatively cold temperature.

Naphtha Filtering

Considerable filtering has been done on hot oil without naphtha dilution, but as air is used almost entirely for drying the cake and practice has developed that incipient fires are almost impossible to avoid when dumping the press, naphtha dilution has largely replaced hot filtering. The oily cake seems to have a high affinity for oxygen, instances being on record where the cake has flashed upon dumping when filtering a 500 flash oil at only 175 degrees temperature. Naphtha dilution seems logical, as the system is closed and it is necessary to dilute after contacting for wax removal in the cold settling centrifuge operation.

It is our practice to filter at about 110 degrees and to hold the naphtha content as low as good results will permit on the filters. This usually means about 60 per cent of cylinder stock and clay, and 40 per cent of naphtha. Samples are drawn at intervals from the heater for control of the color and these colors recorded against the amount of clay used and the operating temperature on the still.

The operator has constant control of the color made on the oil and a very distinct advantage of contact filtering over percolation is that the stream is of uniform color—in other words, there is a constant and uniform removal of tarry bodies; this is a distinct aid in cold settling and dewaxing as the paraffin bodies free of tar congeal more readily and are thrown out more completely. As a result the pour test of the finished bright stock is much lower than oils refined by percolation. It is desirable to free a stock of wax as completely as possible because it has no lubricating value and decomposes under temperature more readily than the oil.

Filter Presses

The only remaining operation in the contact plant is to remove the clay from the naphtha solution and for this purpose two Sweetland filter presses are provided. These presses are equipped with monel cloth covered plates and so manifolded that the solution is pumped continuously and alternately to a press. The maximum allowable filter pressure is about 50 pounds and there are a number of mechanical features about the operation of a filter which are important and require careful watching.

In building up the cake it is essential for best throughput to regulate the pressure from a low initial to a steadily increasing pressure so that the particles will be properly arched in the cake and not too densely compacted. The gravity of the solution charged the filter is a vital factor in filtering, as with a low gravity solution the solids content of the solution is greater and more porous cake is deposited. The charge is continued on the press until the pressure builds up to what is termed a critical pressure, beyond which it is not economical to proceed; of course, the pressure is also governed by the allowable working pressure on the filter, and pressure relief valves installed to protect the equipment. The economical pressure for filtering can only be arrived at through careful tabulation of the rate flow. During the entire course of cake building it is desirable to eliminate pulsation as much as possible because it has a tendency to vary the velocity through the cake and results in compacting.

When the filter is up to pressure the charge is cut to the other filter and naphtha wash in roduced into the filter, the wash continuing under pressure until the gravity of the sample approaches the gravity of the naphtha, indicating that most of the oil held in the cake has been removed in the wash; this requires about 10 to 20 per cent of naphtha wash to the volume of stock solution filtered. As the dilution used in contacting is considerably less than that required for dewaxing, it is advisable to yield the wash to filtered solution and build the solution up to the required naphtha percentage in this manner.

The stock contained in this wash has been shown to be similar in every way to that contained in the filtered solution, although the impression still persists that the stock washed from the filter carries a high content of the undesirable impurities. As a matter of fact, a solvent of entirely different character is required to remove these impurities from the clay. Care should be used in washing to prevent any rupture of the cake on the screen, and it is good practice to use a wash containing some clay so that any rupture in the cake will be repaired by the deposition of clay contained in the wash. It is necessary to remember in filtering with this type of press that the filtration is done on the surface entirely, so that it is important to feed homogeneously in filtering and the feed should be constantly agitated for this purpose. After the wash is completed, air pressure is put on the filter as the wash is withdrawn in an effort to retain the cake on the screen until it is blown as free as possible of solution, when the press is opened up and the cake dumped to a bin below the filter by gently tapping the filter leaves.

Cleaning the Press

Steaming the press is impractical where metal cloths are used on the plates, as the cloth speedily clogs up and cleaning is extremely difficult. Considerable development work has been done on the use of fabric bags to overcome this trouble, with some success. No doubt the use of cloth is worthy of study but a caution concerning steaming a cold press might be mentioned in passing. This practice develops severe temperature stresses in the cast iron shell of the press and should be followed with extreme caution to avoid its possible rupture.

It is important to note the spacing on the leaves in the press and that they are spaced far enough apart so that with proper operation the cake will never build up to entirely fill the space between plates; if this condition is allowed to develop in practice the filtering will be unsatisfactory because of the depth of cake through which the solution would have to travel.

The dry cake dumped from the operation, even with most effective washing, contains considerable naphtha and some clay and the loss in the contact plant will average about 5 per cent back on the total solution charged, of which, of course, the major portion is naphtha.

The filtered solution from the contact plant is charged to cold settling tanks and processed in the regular manner for dewaxing and final reduction to bright stock.

Finished Product

In the plant described, it is possible to run continuously an average of 450 barrels a day of acid oil and secure color with an average consumption of about 15 to 20 pounds of clay to the barrel of acid oil. We are producing on this basis a finished bright stock of:

Flash	530
Fire	610
Vis/210	155
Color	1¼ Tag. Rob.
R.E. No.	10/18
Car. Residue	1.4% max.
Pour Test	14/20

It must be appreciated that the contact operation is new and there is a great deal of development work to be done on it before the process is perfected. There are many opportunities through further simplification of the process and apparatus to reduce the investment and the manufacturing expense. In common with other refinery apparatus, an effort should be made to hold the investment to the essential equipment only, and develop capacity through the units for low manufacturing expense.

The clay expense is a very large factor in contacting, which will no doubt stimulate efforts to reuse the clay. Experiments indicate that a counter-current process may be used in contacting which will reduce the clay required, and methods for revivifying the clay will no doubt grow out of the need for them.

DEVELOPMENTS IN PETROLEUM REFINING

(Continued from Page 58)

pipe stills. In one refinery operating labor and ground space covered are only 25 per cent of the corresponding shell still figures.

Vacuum Distillation

The use of high vacuum stills is increasing. By high vacuum is meant absolute pressure less than 10 MM. or a half-inch of mercury. While a number of installations of the batch shell type vacuum still are operating successfully, it is highly probable that these cannot compete with a continuous still preferably of the coil type. While most vacuum distillation has been carried out heretofore on the relatively low boiling naphthenic crudes, nevertheless this method has a real application to some products from paraffin base crude, even Pennsylvania. The advantages of high vacuum distillation are usually given as larger yield and better quality of product, but it is reasonably certain that direct and indirect fuel savings are equally important. Rapid development of vacuum distillation is predicted.

Improvements in cracking have taken place along several lines; increased thruput of stock and increased output of gasoline per unit by better utilization of heat and increased heating surface is a major improvement on the heat pressure systems as is the greater flexibility as regards charging stock. The use of aluminum chloride for cracking now appears to be commercially successful and important. Vapor phase cracking is no longer experimental. Several plants using this method are in operation and others are in course of construction. In view of the immediate importance of the detonation characteristics of gasoline, vapor phase cracking would seem destined to hold an important place.

Since gas production of the refinery is increased by cracking, particularly at low pressure or in vapor phase, the problem of utilizing this gas is receiving study in many quarters. While commercial solvents such as alcohols, ketones and esters are now being produced from refinery gas in small yield, there is reason to believe that complete conversion of this gas into motor fuel is not impossible.

Contact Filtration

The use of fine clay or fuller's earth for decolorizing is another development that has a real place in most refineries. This so-called contact process, in my opinion, will supplement percolation through clay but will not displace it.

The advantages of contacting with fine clay appear to be very marked over acid treatment of distillate lubricating stock. A light acid treatment of such stock followed by fine clay gives decidedly more finished oil, the increased yield representing about 95 per cent of the increased profit over acid treatment alone. this connection, it should be remembered that as the demand for fine clay increases, its price will increase and approach that of 30/60 mesh earth. Its recovery and reuse will then present another refining problem.

Mention is made of the increasing use of clay burning equipment of the Herreschoff and Wedge type. Its popularity is justified because the regenerated clay has a decidedly longer life than that burned by the conventional rotary kiln and at least some of the gravity flow type.

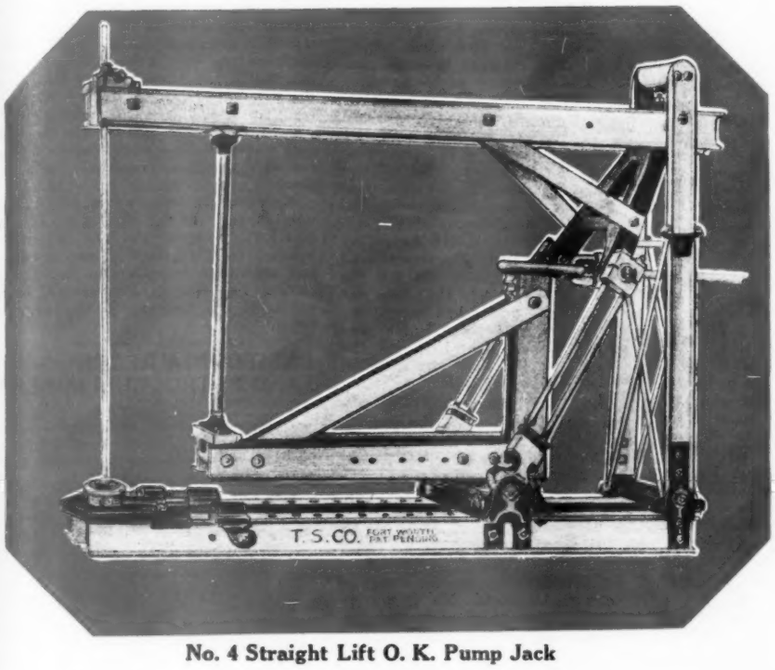
The Edeleanu method of refining by extraction with liquid sulphur dioxide is widely used on the Pacific coast. Kerosene so prepared from California crude is competitive in quality with the best made from Pennsylvania or West Virginia crude. The use of the liquid sulphur dioxide process in eastern refineries has not been imperative, and, therefore, the high initial cost of the installation and the considerable royalty have reacted against it. Its merit, however, is undoubted and wider use is to be expected.

The subject of centrifugal dewaxing is too well known to all of you to require more than reference and the statement that its application has been broadened and improved.

Other improvements now available to the refiner are vapor phase treatment of gasoline with fuller's earth, various methods of sweetening, of sulphuric acid regeneration and of recovery of gasoline from refinery gases.

From the mechanical viewpoint, we note many worth-while advances among

Improved



No. 4 Straight Lift O. K. Pump Jack

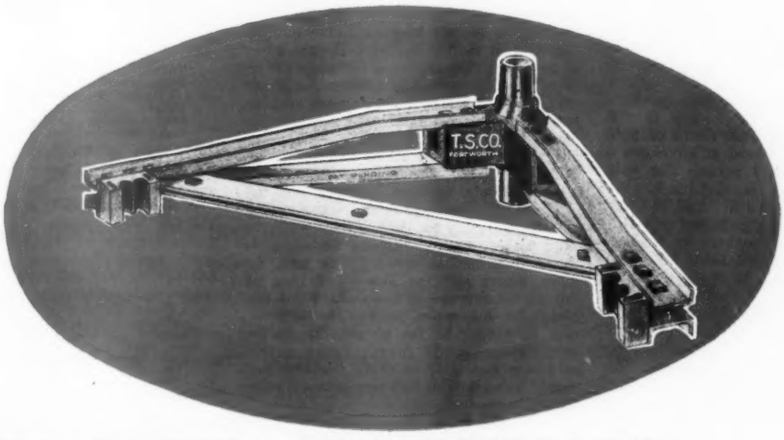
SIMPLICITY of design, rigidity of construction, ease and economy of installation, smoothness of operation, adjustable straight lift stroke, and low cost make this new jack the ideal medium for the application of power to wells in the 2,000 and 3,000 foot range, or to any well of lesser depth on which a smoother operating and longer lived jack is desired.

For deeper wells, the Texas Steel No. 5 Straight Lift O.K. Pump Jack is available. This jack is built on the same engineering principles as the No. 4, but weighs 2166 lbs. with a 9′ beam, 2292 lbs. with 16′ beam and counterbalance attachment and has a stroke range from 26″ with 18″ power to 57½″ with 24″ power.

Both jacks are shipped complete, ready for installation on either a wooden or concrete base, one of their most attractive features being the ease and economy of installation.

Write for a detailed description of these jacks, and prices.

It Will Be Worth Your While



THIS No. 4 Heavy Duty Swing is designed as a companion for and to meet the same conditions as the Texas Steel No. 4 Straight Lift O.K. Pump Jack.

Oversize electric steel main castings allow ample spread to prevent damage when in operation. Channel and base connections are reinforced permitting the use of three instead of the one bolt usually employed which eliminates the possibility of sheared bolts and prevents the failure of channels at base connections. Double cross braces 5″ wide, eliminate the chance of breaking connections

All oil reservoirs are made integral with parts served, thereby avoiding leakage and permitting days to intervene between oilings. Stirrup boxes are double to accommodate two rods in the same direction and the boxes have separate oil reservoirs for each bearing. Furnished complete with 1½″ D stirrups and corner bearings for either pipe or wooden posts.

For deeper wells the Texas Steel No. 5 Swing is available, and is designed as a companion for and to meet the same conditions as the Texas Steel No. 5 Straight Lift O.K. Pump Jack.

Improved Hold-Up Hold-Down

The tubular section comprising the top member of the frame also acts as a reservoir for oil to lubricate all bearings and the D stirrup on the end of the pendulum. The stirrup serves as a valve or cover for the oil duct and prevents the escape of excess lubricant.

TEXAS STEEL CO.

FORT WORTH, TEXAS

which are the use of the Diesel motor; improved steam and electrically operated pumps including those for hot oil; larger forged reaction chambers for cracking; alloys for special purposes; measuring instruments; automatic controllers for temperature, pressure, liquid leve', etc.; sampling devices; paints and other protective coatings, refractories and heat insulation.

Corrosion Problem

Perhaps the most serious problem confronting refiners today is that of corrosion. Even those of you who have suffered but little in the past will become vitally interested as crude becomes more corrosive through increase of chlorides or sulphur content. Cracking and pipe still operations make the matter still more important because the indirect cost of interrupted use of the apparatus is quite as serious as the cost of repairs and replacements. The remedies for corrosion troubles can come only from research—if that overworked rule is permissible. Furthermore the investigational search for causes, effects and preventive measures must be co-operative between all branches of our industry. It is my firm belief that the crying need in corrosion study is a leader, a man with necessary technical knowledge, with enthusiasm, vision and balance and a man who can command or win the whole-hearted respect and confidence of the petroleum industry. Committees can help the work in advisory and other capacities, but the work needs an individual director with complete authority and adequate financial backing.

ORGANIZE STUDY OF GAS CONSERVATION

(Continued from Page 53)

portion to the knowledge regarding the function of gas being widely disseminated so that there may be unanimity of opinion as to the best methods of applying it. Consequently it was readily agreed by the companies present that they would lend their technical experts and supply their technical data for the purpose of making a comprehensive study of this problem; that they would lay the same before the industry generally and before the institute in particular.

It was deemed desirable that this study be organized immediately. The general plan comprehended organizing four regional committees covering, respectively, the Pacific Coast, Rocky Mountains, Kansas and Oklahoma, and Texas and Louisiana. The Appalachian region was omitted merely because a representative was not present to speak for that region, but it will probably be later included. Regional chairmen were appointed to organize the study in each of the said regions. They were authorized and instructed to make a systematic study of the knowledge available in that particular region, picking out those companies and individuals best fitted to give worthwhile contributions to this study and to organize such individuals and representatives of companies into an efficient working committee that would give its complete time during the next succeeding four to six weeks in compiling and analyzing data on the subject.

Scientists to Participate

In addition, at the suggestion of R. L. Welch, secretary of the institute, and concurred with heartily by E. W. Clark, its president, and all others present, it was decided there should be enlisted in this study outstanding scientists of the country entirely apart from the petroleum engineers connected with the industry itself and that these petroleum engineers and scientists should give constant application to the study up to October 17. On that date a general meeting is called at Ponca City, Okla. The four regional subcommittees of petroleum engineers and the scientists engaged in the study will first assemble, compare and analyze their data and formulate conclusions. A day or so later these subcommittee will be joined by the general conservation committee and such other officials of the institute and notables as may be interested in the subject.

The data will eventually be turned over to the American Petroleum Institute. It is a study under the auspices of the American Petroleum Institute, and for this reason it is desired that it be made as representative of the whole institute as is possible. Therefore, an effort will be made to enlist representatives from every school of thought in the institute and in the industry.

It is expected that the present study will be only the beginning of a very extensive one. Because of the short time in which to get this preliminary matter in hand, it will be impossible to enlist at this time all those who might be helpful. But the study is by no means a closed one; helpful suggestions and data from all sources will be welcomed.

A preliminary meeting of Kansas and Oklahoma engineers will be held in Ponca City, in the research department, Marland office building, 11 a. m., September 23. Each of the other chairmen will be organizing his forces in his own manner and in his own district as this one in Kansas and Oklahoma.

N. P. A. ANNIVERSARY WAS NOTABLE MEETING

(Continued from Page 57)

public criticism and attack. It is fair game for every editorial writer and politician. It is the target for unjust and uneconomic enactment by every legislative body in the land clear down to the council of the smallest village. Every motorist harbors the conviction that he is the victim of a mysterious and iniquitous oil industry. He can not understand the economic phenomena of the industry and, therefore, like primitive man confronting something mysterious, he is sure that they must be the workings of evil spirits . . .

"Many of us have urged the necessity of the industry's engaging in publicity for a common defense. The industry, however, can not make any permanent headway through publicity so long as the economists are ignored and kept on the outside. The history of human thought has been that the ideas of the many were once the ideas of the few. Propaganda may have quick and often disastrous results. The oil industry will have nothing worthwhile to tell until it has made a complete economic analysis, and it will get to no lasting beneficial result of publicity until it has arrived at conclusions with which economists agree. The only worthwhile armor is the truth. We should not fear the truth. And if there are any criticisms of our industry which are true we will get nowhere by evading them. It is idle to call the learned critics mere theorists. It is the theorists who, in the long run, shape the thoughts of humanity, and practical men merely cash in on the results to their profit or their grief."

Greetings from Associations

Representatives of other associations who brought greetings on the Silver Anniversary included W. R. Boyd, Jr., assistant general counsel and secretary, American Petroleum Institute; G. G. Woodruff, director, Western Petroleum Refiners Association, and James A. Gilmore, secretary, American Oil Men's Association.

Mr. Boyd in extending fraternal greetings, said that an oil association survived only so long as it served. He gave a hearty tribute to Judge Chamberlin, saying the oil industry owed him a debt of gratitude for his work with the National Petroleum Association.

G. G. Woodruff, in extending the best wishes of the Western Petroleum Refiners Association, said that the National Petroleum Association had been a pioneer in co-operative effort for the good of the oil business. He also stated that when the great part of the oil industry moved west from western Pennsylvania, it took with it many of the best traditions of the association. He pointed out that the oil industry can at least say for itself that gasoline is now perhaps the cheapest commodity in general use.

James A. Gilmore, secretary of the American Oil Men's Association, was another speaker who paid tribute to Judge Chamberlin. Mr. Gilmore said that he had come in contact with him while secretary of the Michigan Jobbers Association and later in his present capacity, and was firmly convinced that he was one of the wisest counsellors in the oil business. Mr. Gilmore diverted to say that he believed regulation of oil production could be brought in a sane and orderly manner, but he thought government regulation would be better than private regulation. He believed radical legislation would be successfully opposed by the oil associations.

Edward Prizer Reminisces

Edward Prizer indulged in some reminiscing not in the course of his prepared address. His statement that he had completed 46 years of service with the Vacuum Oil Co. brought much applause. He recalled that at the time he went with the company Pennsylvania crude oil was its only source of supply. He also commented on more modern developments. He said that if the governor of Virginia had his say, gasoline would be selling for 2 cents per gallon. He remembered the time when it actually did sell for that. He said humorously that this was before "The happy family had been blown up by the Supreme Court." He was vociferously cheered when he said the oil business was going to come out on top despite political agitation.

Rivals Present

An interesting feature of the convention was the presence of two friendly rivals whose companies have figured widely in the so-called Russian oil dispute. Mr. Prizer's company, (the Vacuum Oil Co.), recently purchased some Russian kerosene to the apparent horror of the Dutch-Shell combine and other companies. Richard Airey, of the Dutch-Shell organization, was in the audience as an interested listener. Mr. Prizer, in his address, failed to mention Russian oil, although he talked at length regarding practically every other country in that part of the world.

Accident Prevention

H. M. Blakeslee, of the safety council, of the association, spoke on accident prevention in the oil business. He pointed out that in the oil industry the tendency is to figure insurance as completely covering all losses due to accident, without taking into account other factors such as loss of time, for instance. He recommended that definite programs be laid out by heads of companies for restricting accidents. Steps that could be taken might include making one man in the organization responsible for the carrying out of the program, and the creation of competition among various departments to keep accidents down. He said he knew where accident losses had been as low as an average of ten dollars per employe for an entire year. The elimination of danger as far as possible in the oil industry would constitute an appeal to young men just entering business and would bring to the industry a much more desirable type of worker.

SHREVEPORT MARKET GASOLINE IS TIGHT

SHREVEPORT, La., Sept. 19.—Although there is practically no gasoline available among North Louisiana refiners and the Arkansas situation is tight, sellers in the Arkansas-North Louisiana district Monday, were having considerable difficulty in advancing prices. Two sellers put quotations up to 7 cents but reported getting orders at that figure. Some business was done at 6½ cents, but the majority of shipments were at 6¾ cents. Arkansas sellers are getting 6¾ cents for local shipment. Refiners, however are not soliciting orders as all are behind in shipments and are buying among themselves whenever possible to cover their oversold requirements but they are taking care of regular customers.

It is this business from which they can not get any material advance in price. The 10-cent reduction in Smackover crude Saturday by the Louisiana Oil Refining Corp. was a bearish development in the market, but coming as a surprise, has had no direct effect on gasoline prices so far and may not unless other purchasers fall in line. The Smackover cut is attributed by refiners here to the weak fuel oil market and to the fact that refiners have been losing money handling this crude with higher gravity crudes flooding other refinery markets.

The weak fuel oil market here also is blamed on unfavorable conditions elsewhere. The market here has fallen off despite the fact that there still is not a great amount of material on the spot market and in the face of substantial contract purchases by railroads the past two weeks. In addition to contracts mentioned in previous issues, the Cottonbelt Railroad the past week contracted with two North Louisiana refiners for the delivery of 68,000 bbls. of fuel monthly, the price being $1.07½. Spot fuel is not offered freely under $1.10. The Arkansas fuel market is somewhat weaker with no railroad contracts reported from that area.

Kerosene continued strong although the only change was the elimination of nearly all 4¼ cent material, the market now ranging from 4⅜ to 4½ cents. Gas oil has shown no improvement in price although inquiries have increased, buyers evidently are hesitant to pay over 2¾ cents.

CALIFORNIA RECEIPTS AND PETROLEUM IMPORTS

Imports of crude and refined oils at the principal United States ports for the week ended September 10 totaled 1,301,000 bbls., a daily average of 185,857 bbls., compared with 1,347,000 bbls., a daily average of 192,429 bbls., for the week ended September 3, and a daily average of 196,821 bbls. for the four weeks ended September 10.

	Week end. Sept.10
At Atlantic Coast Ports—	
Baltimore	281,000
Boston	77,000
New York	249,000
Philadelphia	164,000
Others	243,000
Total	1,017,000
Daily average	145,286
At Gulf Coast Ports—	
Galveston district	.....
New Orleans and Baton Rouge	284,000
Port Arthur and Sabine district	.....
Tampa	.....
Total	284,000
Daily average	40,571
At All United States Ports—	
Total	1,301,000
Daily average	185,857
Daily average four weeks ended	196,821

Receipts of California crude and refined oils at Atlantic and Gulf Coast ports for the week ended September 10 totaled 808,000 bbls., a daily average of 115,429 bbls., against 899,000 bbls., a daily average of 128,429 bbls. for the week ended September 3, and a daily average of 118,893 bbls. for the four weeks ended September 10.

At Atlantic Coast Ports—	
Baltimore	80,000
Boston	.....
New York	514,000
Philadelphia	101,000
Others	113,000
Total	808,000
Daily average	115,429
At Gulf Coast Ports—None.	
Daily average	.....
Total Atlantic and Gulf Coast ports	808,000
Daily average	115,429
Daily average four weeks ended	118,893
Distribution of total California receipts is as follows:	
Crude	406,000
Gasoline	237,000
Gas oil	.....
Fuel oil	107,000
Lubricants	58,000
Total	808,000

SAN ANTONIO PRODUCTION

SAN ANTONIO, Tex., Sept. 19.—Production of the various pools in the San Antonio territory as shown by the daily average pipe line runs for the month of August and compared with the runs for July and June were as follows:

	August	July	June
Luling	15,849	16,439	17,243
Lytton Springs	1,960	1,965	2,050
Mirando	7,811	8,166	9,096
Somerset	2,089	2,172	2,200
Calliham	81	83	108
Southton	175	213	228
Total	27,965	29,088	30,925

Number of wells producing in the various pools has been nearly unchanged, the decline reflecting the absence of new drilling.

YOUR SILENT PARTNERS

When you take on the DIAMOND line of Petroleum products, you automatically take two silent partners into your business. The first one standing at your back is the Mid-Continent Refinery contributing a product that is of the very finest. The second working relentlessly for you is Advertising—a silent sales force. You may be assured too of the willing co-operation of our salesmen. They are in your territory, appreciate your problems and are there to be of service.

A well advertised product is a salable product. It has been said that advertising cannot add to or detract one iota from the quality of any product, but it does "lift the bushel from the candle."

The super quality of DIAMOND Motor Oil and the anti-knock values of NevrNox are open for your investigation. They are power pals that meet the exacting requirements of the new-day high compression motors.

Write our nearest office for particulars.

Visiting Oil Men

You are invited to make our offices your headquarters while attending the exposition. Our facilities are at your disposal for handling of telegrams, telephone messages and correspondence. You will find our exhibit in booths 44, 45, 46 and 47, in the Oklahoma Building.

Mid-Continent Petroleum Corporation

General Offices · Cosden Building · Tulsa, Oklahoma

TULSA · CHICAGO · KANSAS CITY · LOUISVILLE · DUBUQUE · ST. LOUIS

One Case Where the Oil I

By W. T. ANDERSON

When you hear it said that oil men cannot be got together in a common effort for the general good of the industry consider what they have accomplished towards standardization of oil field equipment in the past three years.

Here is a concrete example of where they actually have come together and have produced rapid and remarkable results.

They have made more progress in establishing gauges and standards in that time than other industries have been able to attain in 20 years.

This is the more notable because the oil industry was not primarily a mechanical industry. It was a prospecting and mining industry.

From the ancient days when the Chinese drilled their wells by hopping on and off a springboard until comparatively recent years the tools of the industry had been improvisations suggested by experience—based on the familiar practice of trial and error—or, as National Chairman Pew puts it, they "just growed," like Topsy.

They were subject to continual experiment—to see if they would work—and it is a testimonial to the amazing ingenuity and resourcefulness of the oil men of earlier days that they worked wonderfully well and that the industry was always able to meet the constantly increasing demands for its products through ever-improving efficiency.

Possibly it was knowledge of this record and perhaps confidence in their inherent ability to meet any emergency and overcome any obstacle that led old-timers to look askance at the proposal to standardize oil field equipment.

Men in the field were, as Captain Lucey says, scornful of being taught anything by "pencil pushers." Every industrial innovation and improvement has gone through the same stage. It is human nature.

Has Benefited Others

But the men who saw the need for standardization, who saw the waste of time, energy and money through the lack of it and who paid the bills were through with rule-of-thumb methods. The results obtained in other industries and businesses which had adopted the gospel of simplification and standardization preached by Secretary Hoover were making an impression that could not be ignored.

Certainly, if there was any industry which needed standardization of equipment, it was the oil industry. Thomas A. O'Donnell, then president of the American Petroleum Institute, in broaching the subject of standardization at the St. Louis meeting in 1922, declared that the petroleum industry had been, in some respects, rather reckless and spasmodic in field development and very little attention until then had been given to any kind of standardization of equipment. Yet there was nothing more important than good material and tools and there was nothing where there was more confusion.

It was almost unbelievable, he said, how little the ordinary operator knew about the materials he was using. There were 20-odd different grades of steel used in pipe by various manufacturers. No two used the same tapered thread or the same character of connections. There were hundreds of different tool joints not interchangeable, millions of dollars' worth of stock because of various notions about a particular joint for a desired purpose when half that material would ordinarily be required.

These whims of individual purchasers, as the late A. B. Steen pointed out, cost the manufacturers and the industry the advantages of mass production which is more and more eliminating the old-fashioned idea in many businesses of having something different in trifling details just as a talking point. Besides, they imposed the burden of maintaining unnecessarily large stocks that tied up money which might have been spent upon more needed equipment.

Both operator and manufacturer were the losers and it was from this angle of joint interest that the American Petroleum Institute began its standardization work. Its first act was to bring makers and users together for an intelligent analysis of their mutual problem—the best tools for the required uses.

Getting New Viewpoint

Up to that time, it is probably not an exaggeration to say that the contact between buyer and seller was often limited to the buyer making a criticism of the product or the seller arguing its advantages. In either case each was engrossed in his own purpose and neither was making any effort to reach an impartial viewpoint.

When they came together as members of the standardization committees, they were faced by fundamental questions. Was standardization desirable and if not, why not? If it was desirable, what form should it take?

The discussion that followed opened up an entirely new viewpoint. It was no longer a matter of buying and selling but of use and results. There was an exchange of constructive opinions. The user explained his difficulty and the maker interested himself in overcoming it.

Out of that intimate and open-minded contact broader and better understanding grew and united both parties in the single effort to arrive at the best possible result.

Manufacturers have spent hundreds of thousands of dollars in preliminary work, drawings and blue prints, correspondence and telegrams. Producing companies have devoted the time of over 400 executives, engineers and field men to like purposes and the Division of Standardization of the American Petroleum Institute has acted as a clearing house for the various committees for the past three years.

The complexity and magnitude of the work may be gathered from even a glance at the list of specifications, approved or tentative, published for the first time in this issue of The Oil and Gas Journal. Previous reports have been only reports of progress but it is now possible for the industry in this issue to get a comprehensive view of the whole undertaking and what has been accomplished.

Value of Master Gauges

The establishment of master gauges is an illustration of the extreme care and labor taken to secure a theoretically perfect standard yet with tolerances which will make proper allowances for the inevitable variations in commercial manufacture and industrial use. These gauges have been carried to the ten-thousandth of an inch to reduce the variable in manufacture or service to the minimum. At the same time a code of practice has been established which will assure the utmost in conformity.

Before this, no master gauges that were public property were available to the industry. Now anyone can place an order with the American Petroleum Institute and obtain a working gauge certified by the authority of the Bureau of Standards at Washington.

More than $250,000 has been expended for these grand master gauges deposited with the Bureau of Standards at Washington and regional master gauges deposited in the principal oil fields which are to be used for checking the working

Industry Got Together

gauges which will cost another quarter-million, a total of a half-million dollars for these gauges alone.

That measures the importance of these contributions to the standardization of oil field equipment, yet it is noted W. S. Farish says the saving in interest on investment in warehouse stocks has repaid the expense of the past few years on standardization work.

A Stock of 50,000 Items

How great a saving this reduction in variety of stocks has meant is shown by the fact that one supply house found it required 50,000 different items to take care of the business. An impressive comparison is the fact that one equipment company has been enabled through standardization to reduce its stock from 306 varieties to 11, a reduction of 30 to 1. There were nearly 200 different sizes of derricks in use and innumerable rig parts that varied only enough to be noninterchangeable. The A.P.I. specifications provide for interchangeability, for standard foundation dimensions, capacity and wind load.

Belting is probably subjected to greater strains in the oil field than in almost any industry yet the belting committee found it necessary to originate its own campaign of basic research to develop the information necessary for standardization purposes. Tests were conducted in laboratories of universities, of oil companies and belt manufacturers and in the field, until it was felt that the vital characteristics of belting had been determined. Strength and elongation—or "giving"—were found to be the fundamentals and the specifications were designed to secure the most satisfactory service on these points.

Wire rope and manila cordage were other supplies which suffer the severest tests in oil country service. Besides formulating specifications the committee has adopted a code for the care and use of rope in the field which will lengthen the life of lines and minimize trouble.

Cable tool joints as developed in the early oil country shops often took on the ideas of their makers. Gauges, tolerances and other "new-fangled" scientific ideas of modern shops were, of course, unknown and the variety of products was endless. Oil being found in pools in various sections of the country, operators in each section, encountering an unfamiliar problem, were likely to evolve some piece of equipment that came into local use and was regarded as peculiarly fitted for that field. There was no pretense of scientific superiority or real necessity but these variations were persistently continued.

Finding the Reason

There was no national agency for getting those interested in the equipment used in the different fields together until the American Petroleum Institute took up standardization and solved the difficulty by the system of regional commitees meeting with the manufacturers. This enabled operators and manufacturers to check back and find the reason, if any, for the difference in tools and agree upon a standard that would be satisfactory to all. The manufacturer, as well as the operator, is thus avoiding the troubles and complaints that followed the use of a bewildering assortment.

Much of the hesitation in regard to the adoption of standardization is due to misunderstanding of what it means. It does not mean, as Director Carl A. Young of the Division of Standardization pithily says, that everyone must wear No. 8 shoes. It must be flexible. National Chairman Pew distinctly states that there have been no standards adopted that cannot and will not be changed if proven of less value than some other specification.

Those who have no sympathy with standardization should look around and observe in every-day life some of the effects of standardization and compare them with conditions before standardization.

There are those of us, for example, who recall when you went to buy an electric light bulb you had to be careful whether you used a screw or push socket. In the early days of railroads some had one width of track and others another width. It is only ten years since the Australian railroads adopted a universal gauge.

Ford is the outstanding example of standardization and mass production benefiting manufacturer and public. There is no doubt that that success had much to do with the special attention given to standardization in the automotive industry, which is estimated to have resulted in a saving of $300,000,000 last year to the public and the industry. Mr. Horning says that items have been reduced one-fifth by the elimination of the unnecessary, low productive and less profitable. He instances gear shifts, the last four cars having gear shifts differing from the standard will adopt the standard next year.

Practical Gains

The advantages of standardization are much broader than mere simplification and even the savings in avoidance of investment in unnecessary stocks. As carried out in the specifications drafted by the A.P.I. committees with the assistance of the experts of the oil and equipment industries working to a common purpose along scientific lines, standardization will mean assurance of uniformity of material, interchangeability of material of the same kind, better workmanship and better quality of material.

It will facilitate production and maintenance, promote uniform methods of testing, and establish shop and field practices making for efficiency and economy.

Deeper drilling has been mentioned as one great reason for hastening the adoption of standardized equipment. It imposes greater strains and demands better equipment. It also involves larger investment demanding every precaution against loss through taking chances with unsuitable material or what has been termed rule-of-thumb practices.

Within the past few years the industry has become increasingly technical in its operations, requiring exactness in detail that would have been deemed hypercritical in the pioneer days. Although, as stated, not originally a mechanical industry, it is fast becoming one, even a scientific industry. As such it demands tools and equipment of a very different sort from the days of the springpole.

The American Petroleum Institute Division of Standardization has done a fine piece of work. The specifications now published represent the verdict of the field, the best judgment of the operating companies and the manufacturing companies of what is actually needed and most serviceable.

The manufacturers are turning out equipment in conformity to these specifications, bearing the official stamp of the Institute. The companies which have co-operated in the Institute in formulating these specifications have approved their use. The immediate task is to have this standardized equipment put into general use.

The Oil and Gas Journal has devoted this number to the publication of the complete specifications, articles by the national chairmen of the various standardization committees and others familiar with the work in the hope that the industry will thus familiarize itself with what has been accomplished and take advantage of the use of these specifications in the field.

Accomplishments of Standardization

Co-operation of Entire Industry Necessary to Procure Benefits from Long and Tedious Work of Committees

By J. Edgar Pew

Vice President, Sun Oil Co., and General Chairman, Standardization Work for American Petroleum Institute.

The standardization work of the American Petroleum Institute was first undertaken in a methodical way at the St. Louis meeting in 1922. Since that time, the industry has been thoroughly organized throughout the country. Every district has been represented on each of the various committees, in order that the problems of all sections should receive the fullest consideration.

Some of the work has been accomplished with but little difficulty,—other parts have required long and tedious analysis and study. On the questions of belting, wire rope, cable tool joints, rotary drilling joints and pipe, in fact all of the material being considered, large sums of money have been spent on research work, most of which has been free to the Institute and has been done in the larger oil companies' laboratories or in those of the manufacturers.

The purpose of the entire standardization program of the Institute has been to get:

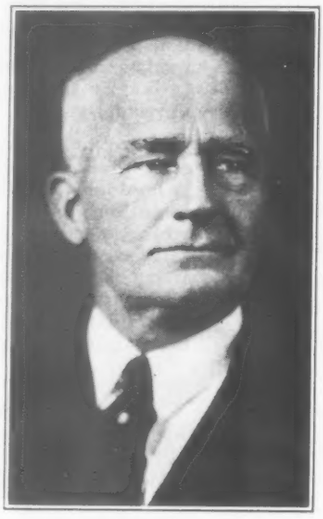
1. Uniformity in material of the same kind.
2. Interchangeability of material of the same kind.
3. Better workmanship on material.
4. Better quality of material.

There is no question but that all of these are desirable and that these accomplishments will effect great savings to the oil industry.

Industry Like Topsy

The oil industry is one that has had a rapid growth, and the equipment used in it has just "growed up" with the industry. This growth, coming as it has, in so many different fields, in different parts of the country under different conditions and operators, has necessitated a vast amount of equipment of almost countless variety. The oil industry and the manufacturers are both deserving of the highest commendation for their ingenuity and ability in being able to master the problems of drilling, production and transportation of this great industry all of this time, with its rapid growth, and the new conditions that were continually arising. This has required ability of the highest type, and the situation was well met. The result of this character of growth of the oil industry, while meeting the requirements of the oil operations, has been the building up of materials of many kinds and sizes for doing the same work—that is a vast duplication of tools and of supplies of varying specifications. One large company alone reported in its warehouse over 50,000 items of different kinds of tool materials. Further, with the greater depth in drilling now necessary, better material is being required and in the case of pipe, new specifications for clearances, etc., are necessary.

The lessons from the war have taught us many of the advantages of standardized equipment and the splendid efforts of the Hon. Herbert Hoover, since the war, have continually kept standardization and economy in business before us. Industry in America owes much to Secretary Hoover and his efficiency program. The Bureau of Standards, in the Department of Commerce, has rendered conspicuous service to the oil industry in its standardization program. All A.P.I. pipe gauges (for casing, tubing, drill pipe and line pipe) must be certified by the Bureau of Standards before the official monogram can be used on the product. All A.P.I. grand master gauges for cable tool joints, rotary tool joints, sucker rods, etc., are officially selected by



J. Edgar Pew

the Bureau and are retained there for reference purposes.

Co-operation Essential

Co-operation of the entire oil industry is essential if we are to derive the fullest benefits of standardization. While the industry, as a whole, admits of the benefits from this work in getting better materials and in the simplification resulting from fewer specifications of materials, there are still some who take exception to certain equipment and evidence their desire to use some material that varies from the standards set up. I believe this position is honestly taken and is not through any desire to hinder a complete standardization program.

On the other hand, if every operator continued with one or more exceptions the benefit of standardization could easily be retarded. We owe it to the Institute, to the manufacturers and to ourselves, to give this program a 100 per cent tryout. There have been no standards adopted that cannot, and will not, be changed if proven of less value than some other specification.

There are three items of the pipe specifications that do not meet the unanimous approval of the operators but in each case they did meet with the approval of the large majority of the committee members. This committee represented every district of production in the United States and consists of over 100 members. It is impossible to get unanimous agreements on all matters and it is sound principle that the majority opinion should prevail, otherwise, no results would be possible.

Pipe Exceptions

The pipe exceptions taken are these:

1. Whether or not an 8 or 10-thread should be used on 8⅝ O.D. (old 8¼) casing. It is conceded by all that sizes under 8-inch should take 10 threads to the inch and that sizes over the 8-inch size should take 8 threads to the inch, and the difference of opinion is only as to whether the 8-inch size should be 8-thread or 10-thread. Tests have been made as to strength, and opinions considered as to advantages in operation, as between these two threads, and the results showed, in the opinion of the committee, in favor of 10-thread. In California, where the average drilling has for some years been deeper than elsewhere, the 10-thread has been universally used. In fact, 10-thread was, I believe, first introduced there, as it made a tighter joint, and was more satisfactory in shutting off water.

2. Another difference arises as to the thread on 2-inch and 2½-inch external upset tubing, whether it should be 10-thread or 11½-thread to the inch. The tests made and the majority of opinions, were in favor of 10-thread, which was adopted.

3. The third difference was as to the 4¾ O.D. casing in place of 5⅞-inch. This change was made because of the fact that where 5⅞ is used, it is in deep wells and is the exception and not the rule,—and the 5⅞ did not give sufficient clearance. It is often necessary to turn down the collars on 5⅞ to make better clearance, which tends to weaken the string. The 4¾ size does give the clearance and a much safer job in setting the casing. Where this size has been used it has given good satisfaction and should be better and safer practice.

Other Sizes Considered

Two additional sizes of casing 7-inch O.D. and 9⅝-inch O.D. are under consideration from the Gulf Coast and will be given consideration at the next meeting of the pipe committee.

The work of all these committees has been carried along simultaneously with continual exchanges of opinion, so that the standards of one committee will not conflict with those of the others. The scope of the A.P.I. standardization program is graphically illustrated herein, and embraces every phase of drilling and producing. Analyses have been made of some materials that, prior to the A.P.I. standardization movement, had received but little consideration, especially from the oil operators, but on which extensive studies and experiments are now under way.

One of the principal features of the work is the contacts that have been established between the various oil-producing districts. We are becoming better acquainted with each other. We are finding out that many of our problems are similar and can, in many cases, be handled in a uniform way. Exchange of opinions on any subject is always helpful. The A.P.I. standardization work is providing the forum for these exchanges of ideas relative to drilling and producing, resulting in the disappearance of many local types and sizes of equipment formerly considered exclusive and indispensable to a particular district. The underbrush of "odd sizes," "special threads," etc., is gradually being cleared away, leaving a clear and firm foundation for the future scientific and practical development of improved drilling and producing methods and equipment.

I hope every operator will co-operate in giving these entire specifications a thorough tryout.

Body you can feel *and* see

A SIMPLE test—one you can easily make. Yet it shows, as clearly as a laboratory investigation, the adhesive and cohesive properties of CROWN Pale motor oils.

These two properties—adhesion, the clinging fast to metal surfaces—and cohesion, the resistance to tearing apart—are both present in CROWN Pales to a marked degree. And in the correct proportion—which, according to petroleum technologists, means *perfect body*.

Even the severest operating conditions cannot break down CROWN body! It assures effective piston seal—minimum power loss. And, together with the carbon-free lubrication for which CROWN Pales are noted, means greater economy to the motorist.

Write for samples and prices.

General Sales Office ~ Post-Dispatch Bldg., Houston, Texas

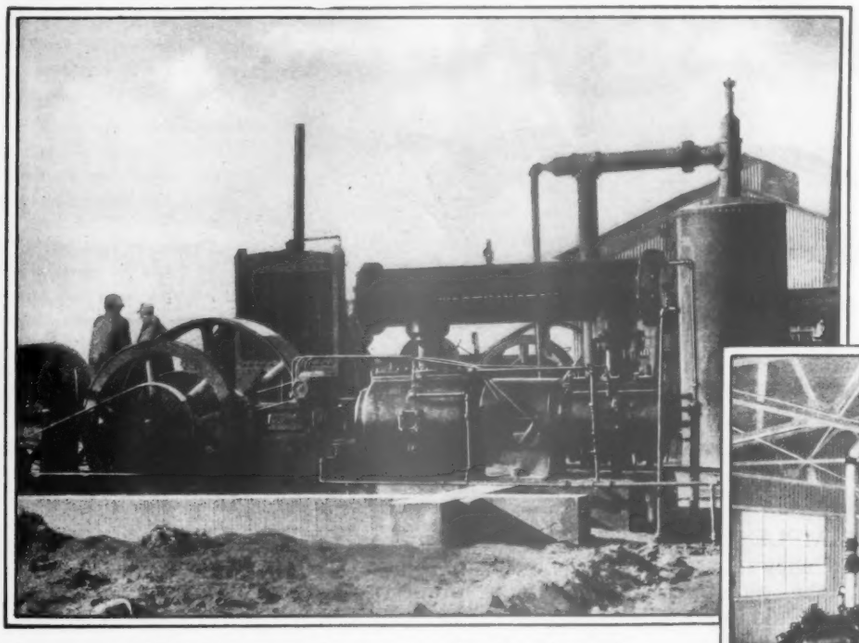
Branch Sales Offices

17 Battery Pl., New York, N. Y. Security Building, Minneapolis, Minn.
Blum Building . . Chicago, Ill. 507 Land Bank Bldg., Kansas City, Mo.

Refinery and Terminal ~ Houston, Texas
Cable Address ~ Crowncen, Houston

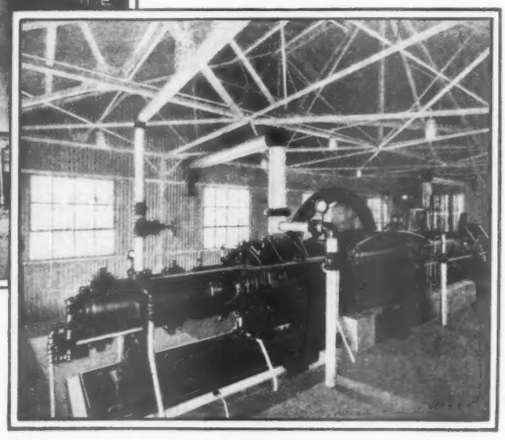
CROWN CENTRAL
PETROLEUM CORPORATION
New York-Houston

WORTHINGTON'S



Two-stage Belt-driven Compressor for air or gas-lift oil-well pumping. Suited for belt-connection to either an electric motor or gas engine.

Worthington Direct-connected Gas-engine Driven Compressor Unit.



The Answer for... Air-Gas Lift Pumping

WORTHINGTON COMPRESSORS for air or gas-lift pumping are the result of a careful study of field requirements.

The belt-driven compressor shown above at the left is adapted to either electric-motor or gas-engine drive—a great advantage when the compressor has to be moved from one field to another. Then, too, the ease with which the compressor can be installed means that little time and money are lost in starting production.

The compressor above has been designed to fill the need for a compact, semi-portable machine. It occupies

WORTHINGTON PUMP AND MACHINERY CORPORATION,

6735-10

ANSWER!..

See the Worthington Exhibit, 4th International Petroleum Exposition Congress, September 24 to October 1, 1927. All equipment on exhibition carried in Tulsa stock.

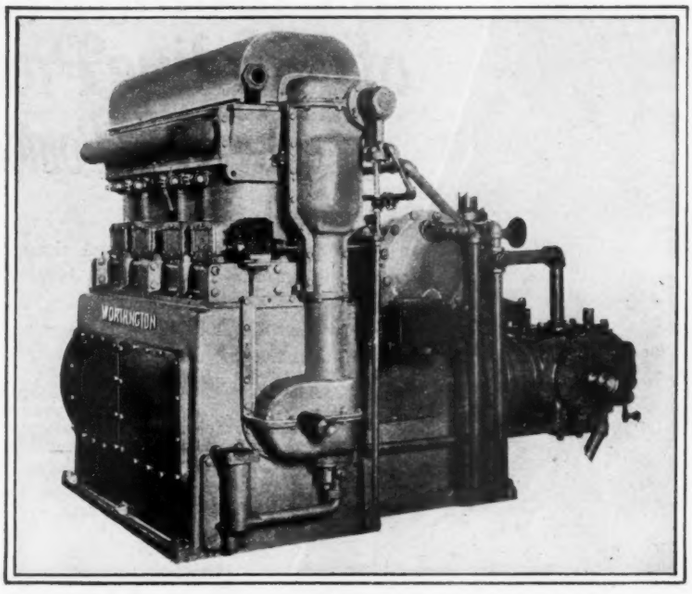
relatively small floor space, reducing building and foundation costs to a minimum, while its light weight permits easy portability from one field to another. In efficiency it compares favorably with larger permanent units. In short, it is a quality product, designed and produced to fill the need for a real, dependable air or gas-lift compressor.

Where more permanent plants are possible, Worthington is furnishing heavy-duty, horizontal engine-driven units in a large range of sizes.

Worthington engineers will be pleased to furnish complete data on any type of oil-field equipment.

Oil Field Specialists At

Tulsa, Okla	Worthington Machinery Corporation of Okla.
Amarillo, Texas	A. M. Lockett & Company, Ltd.
Borger, Texas	A. M. Lockett & Company, Ltd.
Houston, Texas	A. M. Lockett & Company, Ltd.
Dallas, Texas	A. M. Lockett & Company, Ltd.
San Angelo, Texas	A. M. Lockett & Company, Ltd.
New Orleans, La.	A. M. Lockett & Company, Ltd.
Los Angeles, Cal.	Worthington Company, Incorporated
San Francisco, Cal.	Worthington Company, Incorporated



Worthington Two-stage Compressor direct-connected to Four-cycle Worthington Gas Engine. Unit designed for oil-well pumping.

WORTHINGTON PRODUCTS

CONDENSERS *and* AUXILIARIES

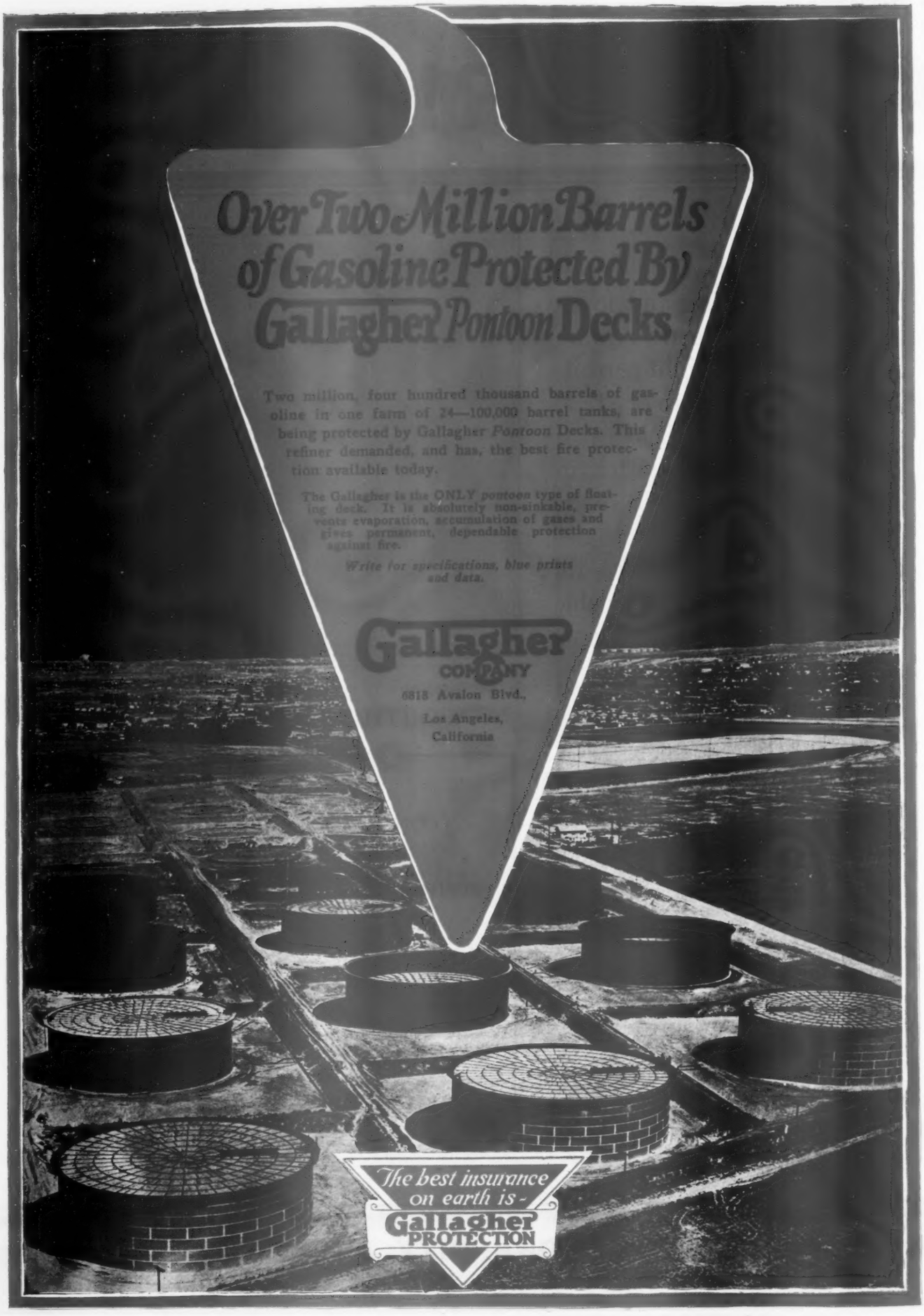
PUMPS FEEDWATER HEATERS

WATER *and* OIL METERS

COMPRESSORS OIL *and* GAS ENGINES

Literature on Request

115 BROADWAY, NEW YORK CITY, BRANCH OFFICES IN 24 CITIES


Over Two Million Barrels of Gasoline Protected By Gallagher Pontoon Decks
Two million, four hundred thousand barrels of gasoline in one farm of 24—100,000 barrel tanks, are being protected by Gallagher Pontoon Decks. This refiner demanded, and has, the best fire protection available today.
The Gallagher is the ONLY pontoon type of floating deck. It is absolutely non-sinkable, prevents evaporation, accumulation of gases and gives permanent, dependable protection against fire.
Write for specifications, blue prints and data.
Gallagher COMPANY
6818 Avalon Blvd.,
Los Angeles,
California
The best insurance on earth is -
Gallagher PROTECTION

Five Years' Standardization Progress

Contrast Between Existing Conditions When Work Was Begun at St. Louis A. P. I. Meeting and Accomplishments Today

How much has been accomplished toward standardization of oil industry equipment in the past five years can best be realized by looking back at conditions as they existed when the American Petroleum Institute adopted its resolution for standardization at the St. Louis meeting in 1922. Now that standardization has been agreed upon for most oil producing and pumping equipment it is interesting to recall the chaotic state that prevailed before standardization was attempted, as shown by the following extracts from the addresses delivered at the St. Louis standardization session in December, 1922:

President O'Donnell's View

Thomas A. O'Donnell, president, American Petroleum Institute, in opening the session, said:

The petroleum industry has been, in some respects, rather reckless and spasmodic in field development, and very little attention has been given to any kind of standardization of equipment. It is well known to all of you that there is no problem attacked by a man that is more abstract in its nature than the drilling of oil wells. There is nothing in connection with your work that is more important than good material and tools with which to do that work. There is nothing in which we are identified in our work where there is more confusion. It is almost unbelievable how little the ordinary operator in the field knows about the material he is using, especially the quality of steel that goes into our casing and our tools.

Nine-tenths of our trouble on the Pacific Coast (because of our peculiar geological condition there and tilting of the formations alternating between the hard and soft material and the great depths to which we have to drill) is caused by defective casing or, if the casing itself is the best that is now manufactured, it is frequently not strong enough to stand the strains.

I understand that there are some twenty odd different grades of steel used in pipe by the various manufacturers over the country. We know that no two of them use the same tapered thread or the same character of connections. There has been some attempt made to standardize along this line, but it has never been perfected.

Demand for Standardization

The petroleum industry cannot expect the manufacturer to meet his requirements in this respect unless there is a great demand from the industry itself to get some kind of standardization.

Today there is the purchase of drill pipe, for instance, on the Pacific Coast that never has been or never will be strong enough to stand the strains put on it. Sometimes it won't stand its own weight. We frequently get into trouble with the drill stand and the tool joints, not knowing ourselves what the different combinations of carbon and steel should be in order that the different joints should make up together. We find that we have a lot of fishing jobs, and we know something is wrong. We get after the tool joint maker. He says, "It is not my joint; it is the casing." We get after the casing people and they say that it is not their casing; it is the tool joint. We stand all the damage ourselves. If any of you have ever been able to find a manufacturer who sold you the wrong kind of stuff you have done better than I have.

It is not intentional on the part of the manufacturer, and I believe the time is ripe although I think if you had attacked it three or four years ago you could not have got anywhere. There has been enough talk in the last three years to bring a demand in the petroleum industry for standardization of materials and tools and pipe we use in our oil wells. This is a broad field and constructive work can be done, if it is properly undertaken.

Field for Constructive Work

After you gentlemen have carefully listened to these discussions and you believe that the time is ripe and that practical results can be accomplished, and you desire to have the American Petroleum Institute father a movement to bring about general standardization, it would be proper to have a resolution presented at the end of this meeting and have the Institute appoint a committee selected from the petroleum industry of the country and its various branches.

I am quite sure we will find the manufacturers prepared to meet us half way in this respect, and my judgment is that the relief will be very great. If such a committee weighs carefully the subject of what is the best kind of tools and steel to be used in them, and the best kind of joint, they may establish a standard that might be known as the American Petroleum Institute standard.

The manufacturer is responsible to supply the necessary carbon and necessary joints to meet the standard on pipe. If you get in trouble with it he is responsible for it. That requires close inspection at the point of manufacture. So it is with our tool joints. We have hundreds of different joints all over the country that are not interchangeable, millions of dollars worth of stock owned by one company because of the various notions of field superintendents in their particular districts desiring a particular joint to accomplish a purpose, where, if these men were educated to the idea of standards, half of the material required ordinarily would be required.

Nothing can be done to save the field operator of America more money or be more constructive along conservation lines than the proper solution of this question.

Speaking of standardization in the oil industry from the engineer's point of view, A. B. Steen (since deceased), Chief Engineer, The Texas Company, said:

A. B. Steen's Opinion

Standardization, simplification and improvement; these are ideas that cannot be altogether separated from one another in relation to the oil industry, but must be considered together. To be sure, the word "standardization" alone is one of exceedingly broad significance and, when coupled with the term "oil industry," embracing as it does, production, refining and transportation, it is evidently quite too broad for this paper, so I shall confine myself to the general aspect of the subject and some of its special applications to rotary drilling equipment.

The question forming the subject of this paper is but a small branch of one which is not merely nation wide, but world wide, in its scope and it will be found to be of such practical importance and urgency in our industry as not to be merely optional with us, but we shall be forced to improve, simplify and standardize in order merely to keep our place with other interrelated and competitive industries.

One of the manufacturers' journals has been for the past couple of years running a series of articles in which successive manufacturers have come forward, each with a story of simplification in his own field and showing the immense saving from it. Some of these individual developments go back to years before the war, so that they had nothing to do with the war itself more than that they were accentuated by it. It seems from these stories that the rapid extension of our industries and increased competition during the past two or three decades have had a converse effect upon them to that now sought; in other words, instead of increasing the profits of the individual concern it decreases them.

Diversification Hinders Mass Production

Manufacturers, in the effort to broaden their business and increase their sales invaded one another's markets, diversified their products and increased the complication of running their business to an extraordinary degree The whims of individual purchasers, retailers and jobbers in different parts of the country were listened to and special shapes and designs were made for each section, not because they were any better than others, but because they were what the consumer had been used to, and the slogan was, "give the people what they want." In doing this the advantages of mass or quantity manufacture were entirely lost sight of in the effort to supply special forms to meet the whims of everybody, and the catch phrase, "the consumer is always right," was extended to mean that he knew more about correctness of design than anybody else, notwithstanding the fact that forms used in his section were merely a matter of local growth from old fashioned patterns and had never been subjected to any engineering investigation of design.

This state of things, as could readily have been foreseen, led to the present impasse. Manufacturers have tried to extend their lines so far that the advantages of mass production have been frittered away in the attempt to fill special orders, often not in their own lines, and to the detriment of the standard goods which they were equipped to handle. And rival manufacturers of the same article changed its dimensions or form in some trifling details, merely to have it different or "individual," or perhaps to give salesmen a talking point. So far as the consumer is concerned, (and I am here speaking for the consumer rather than the manufacturer), I may say that these attempts towards "individuality" of design do not impress him at all, nor, I am sure, do they increase that particular manufacturer's sales with him in any way.

Benefit of Standardization Recognized

What he sees is that he has various forms, none of which are interchangeable

(Continued on Page 314)

RESOLUTION ON STANDARDIZATION OF OIL FIELD EQUIPMENT

At the concluding standardization session on December 8, 1922, the following resolution proposed by the joint committee on resolutions consisting of representatives of the Board of Directors of the American Petroleum Institute and members representing the group session on standardization was unanimously adopted:

Resolved, By the group session on standardization that it is their judgment that standardization, simplification and improvement of oil industry equipment and methods is necessary and desirable and will result in great economies; be it further

Resolved, That the Board of Directors of the American Petroleum Institute be requested to declare it to be the policy of the Institute to encourage and to bring about standardization and simplification of oil industry equipment and methods where desirable and practicable and to the end that the Board of Directors of the Institute be requested to appoint such committees of the oil industry as may be advisable to carry on the work in co-operation with the executive staff of the Institute and with the various agencies already contributing valuable work on the subject, such as American Society of Testing Materials, Simplification Bureau, Department of Commerce, Bureau of Mines, Bureau of Standards; and be it further

Resolved, That whereas committees of various associations and organizations are already doing commendable work on particular subjects relating to standardization:

1—Casing—J. Edgar Pew, chairman of the Committee on Casing and Rotary Drill Pipe of the Mid-Continent Oil and Gas Association.

2—Cable Tools—Grant Hubley, chairman of committee conference held under the auspices of the American Petroleum Institute.

3—Rig Irons—H. J. Lockhart, chairman of voluntary committee of manufacturers called together under the auspices of the American Petroleum Institute and co-operating with the Tulsa Purchasing Agents' Association.

4—Rotary Tool Joints—S. A. Guiberson, Jr., who has been co-operating with the various agencies to bring about standardization of tool joints.

the chairmen of the above committees be requested to continue their work and to obtain general agreement if possible on the best practical standards and to submit the results of their work to the directors of the Institute for action.

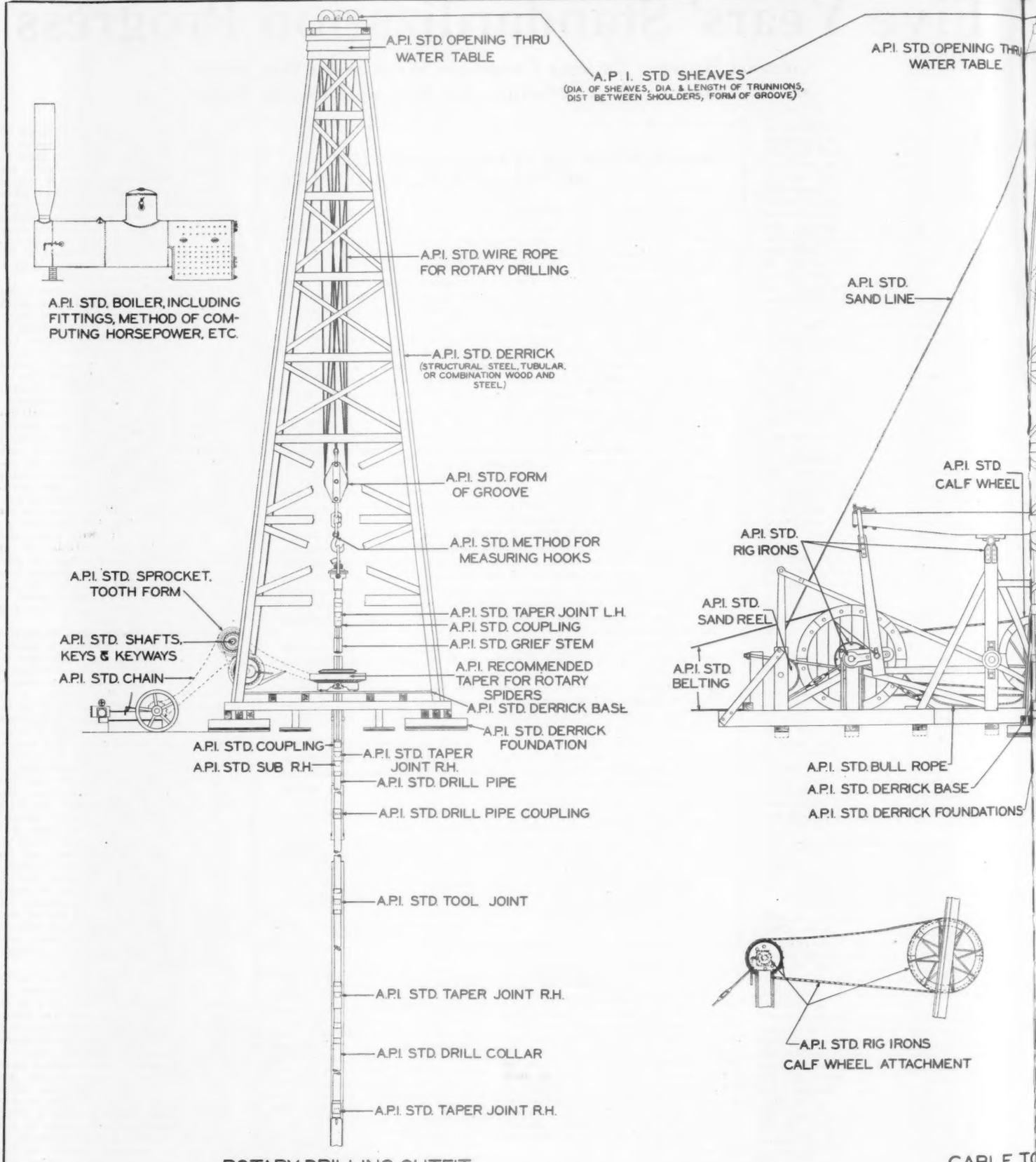
Be it further Resolved, That it is the recommendation of the group meeting that such standards and specifications as shall be finally approved by the Board of Directors of the American Petroleum Institute should be known as A.P.I. standards and specifications.

The motion to adopt by Mr. Lucey was seconded and carried.

The joint committee was composed of the following:

Members representing the Board of Directors: W. S. Farish, J. F. Lucey, E. C. Lufkin, J. E. O'Neil, A. A. Moody, F. H. Hillman (not present), R. L. Welch.

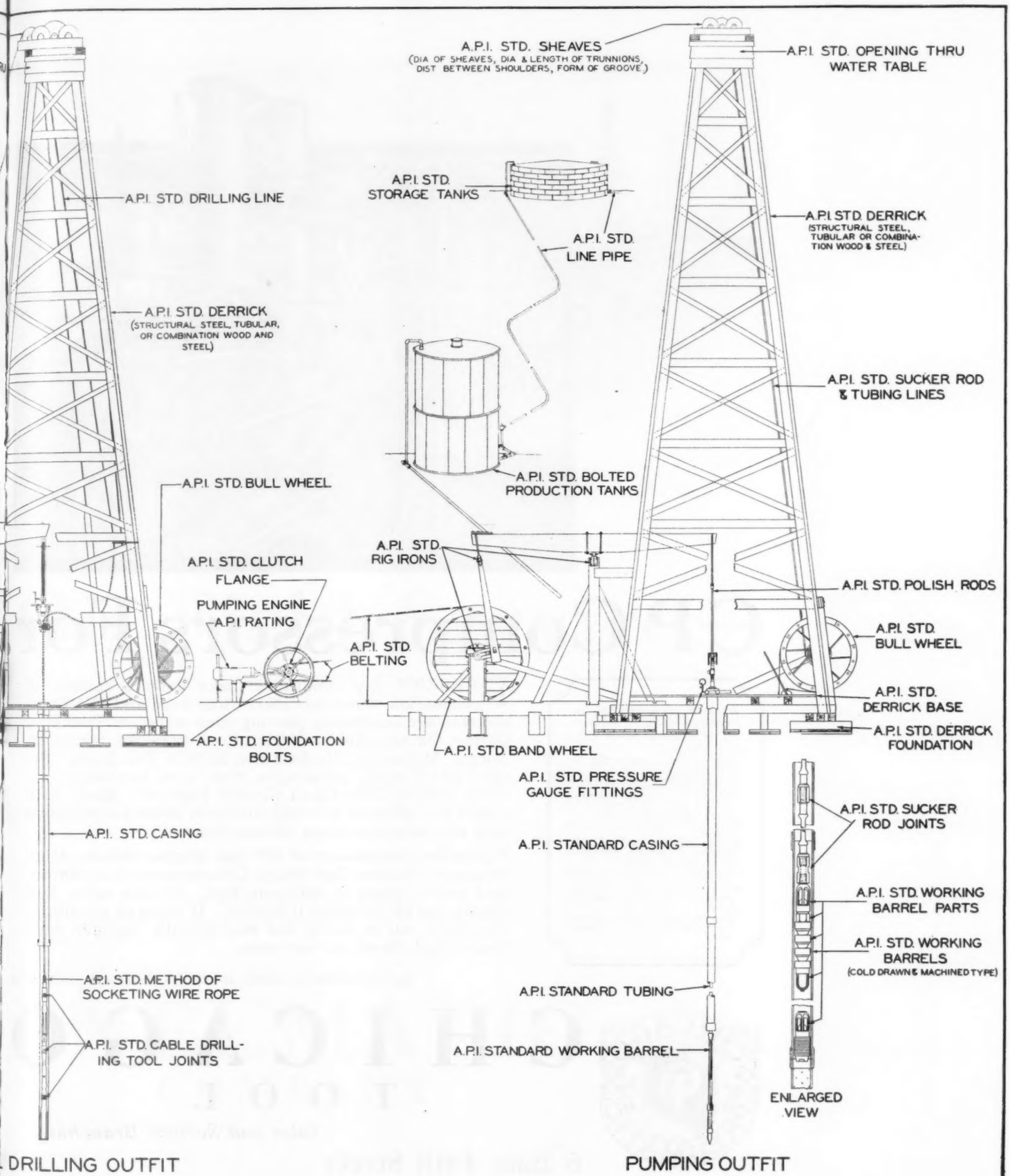
Members representing the group session: J. Edgar Pew, H. J. Lockhart, A. B. Steen, O. V. Borden, Grant Hubley, S. A. Guiberson, Jr., G. F. Mahan (not present).


A.P.I. STD. OPENING THRU WATER TABLE
A.P.I. STD. SHEAVES
(DIA. OF SHEAVES, DIA. & LENGTH OF TRUNNIONS, DIST BETWEEN SHOULDERS, FORM OF GROOVE)
A.P.I. STD. OPENING THRU WATER TABLE
A.P.I. STD. BOILER, INCLUDING FITTINGS, METHOD OF COMPUTING HORSEPOWER, ETC.
A.P.I. STD. WIRE ROPE FOR ROTARY DRILLING
A.P.I. STD. SAND LINE
A.P.I. STD. DERRICK
(STRUCTURAL STEEL, TUBULAR, OR COMBINATION WOOD AND STEEL)
A.P.I. STD. FORM OF GROOVE
A.P.I. STD. CALF WHEEL
A.P.I. STD. METHOD FOR MEASURING HOOKS
A.P.I. STD. RIG IRONS
A.P.I. STD. SPROCKET, TOOTH FORM
A.P.I. STD. TAPER JOINT L.H.
A.P.I. STD. COUPLING
A.P.I. STD. GRIEF STEM
A.P.I. STD. SAND REEL
A.P.I. STD. SHAFTS, KEYS & KEYWAYS
A.P.I. STD. CHAIN
A.P.I. RECOMMENDED TAPER FOR ROTARY SPIDERS
A.P.I. STD. BELTING
A.P.I. STD. DERRICK BASE
A.P.I. STD. DERRICK FOUNDATION
A.P.I. STD. COUPLING
A.P.I. STD. SUB R.H.
A.P.I. STD. TAPER JOINT R.H.
A.P.I. STD. DRILL PIPE
A.P.I. STD. BULL ROPE
A.P.I. STD. DERRICK BASE
A.P.I. STD. DERRICK FOUNDATIONS
A.P.I. STD. DRILL PIPE COUPLING
A.P.I. STD. TOOL JOINT
A.P.I. STD. TAPER JOINT R.H.
A.P.I. STD. DRILL COLLAR
A.P.I. STD. TAPER JOINT R.H.
A.P.I. STD. RIG IRONS
CALF WHEEL ATTACHMENT

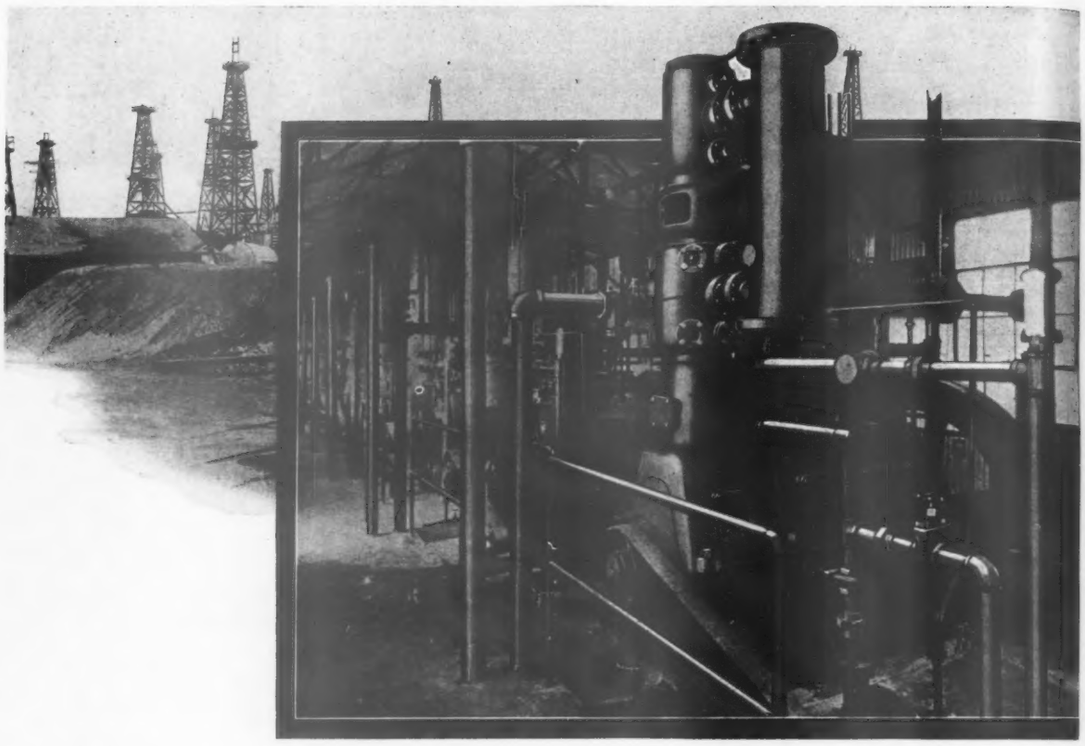
ROTARY DRILLING OUTFIT

CABLE TO DR

SCOPE OF A.P.I. S


A.P.I. STD. SHEAVES
(DIA OF SHEAVES, DIA & LENGTH OF TRUNNIONS, DIST BETWEEN SHOULDERS, FORM OF GROOVE)
A.P.I. STD. OPENING THRU WATER TABLE
A.P.I. STD. STORAGE TANKS
A.P.I. STD. DRILLING LINE
A.P.I. STD. LINE PIPE
A.P.I. STD. DERRICK (STRUCTURAL STEEL, TUBULAR OR COMBINATION WOOD & STEEL)
A.P.I. STD. DERRICK (STRUCTURAL STEEL, TUBULAR, OR COMBINATION WOOD AND STEEL)
A.P.I. STD. SUCKER ROD & TUBING LINES
A.P.I. STD. BULL WHEEL
A.P.I. STD. BOLTED PRODUCTION TANKS
A.P.I. STD. RIG IRONS
A.P.I. STD. CLUTCH FLANGE
PUMPING ENGINE A.P.I. RATING
A.P.I. STD. POLISH RODS
A.P.I. STD. BULL WHEEL
A.P.I. STD. BELTING
A.P.I. STD. DERRICK BASE
A.P.I. STD. FOUNDATION BOLTS
A.P.I. STD. BAND WHEEL
A.P.I. STD. DERRICK FOUNDATION
A.P.I. STD. PRESSURE GAUGE FITTINGS
A.P.I. STD. SUCKER ROD JOINTS
A.P.I. STD. CASING
A.P.I. STANDARD CASING
A.P.I. STD. WORKING BARREL PARTS
A.P.I. STD. WORKING BARRELS (COLD DRAWN & MACHINED TYPE)
A.P.I. STD. METHOD OF SOCKETING WIRE ROPE
A.P.I. STANDARD TUBING
A.P.I. STD. CABLE DRILLING TOOL JOINTS
A.P.I. STANDARD WORKING BARREL
ENLARGED VIEW
DRILLING OUTFIT
PUMPING OUTFIT

STANDARDIZATION



CP Compressors For

A Few of the Salient Features of CP Tandem Air Compressors

- Simplate Valves.
- Two-Stage unit construction for high pressures.
- Two-Stage duplex units for low or medium pressures.
- Easily installed—small foundation—often mounted on skids together with electric motor.
- Easily moved from one location to another.
- Medium capacity and in sizes adapted to battery installation for centralized control.
- Wide ranges of types and pressure regulation.
- Wide range of drives; oil, gas, steam, belt or direct connected motor.
- Wide range of cylinder combinations—cylinders all interchangeable.

PRESENT day conditions make definite control of production more important than ever and CP Compressors are constantly proving their value in Tonkawa, Garber, Oxford, Hubbard, Glen Pool, Wewoka, Seminole, Borger, McCamey, Winfield and Spindle Top fields. Because of the many advantages, there is an increasing tendency toward Centralized Control Stations. Many such plants in California and mid-continent fields are equipped with ten, twenty or more CP machines.

The above installation of CP Gas Engine Driven, High Pressure, Tandem Two-Stage Compressors, is a centralized control plant in Seminole field. Similar units, Full Diesel, can be furnished if desired. If changed conditions require, it can be easily and economically changed from Gas to Full Diesel, or vice versa.

See representative exhibit of Chicago Pneumatic products at

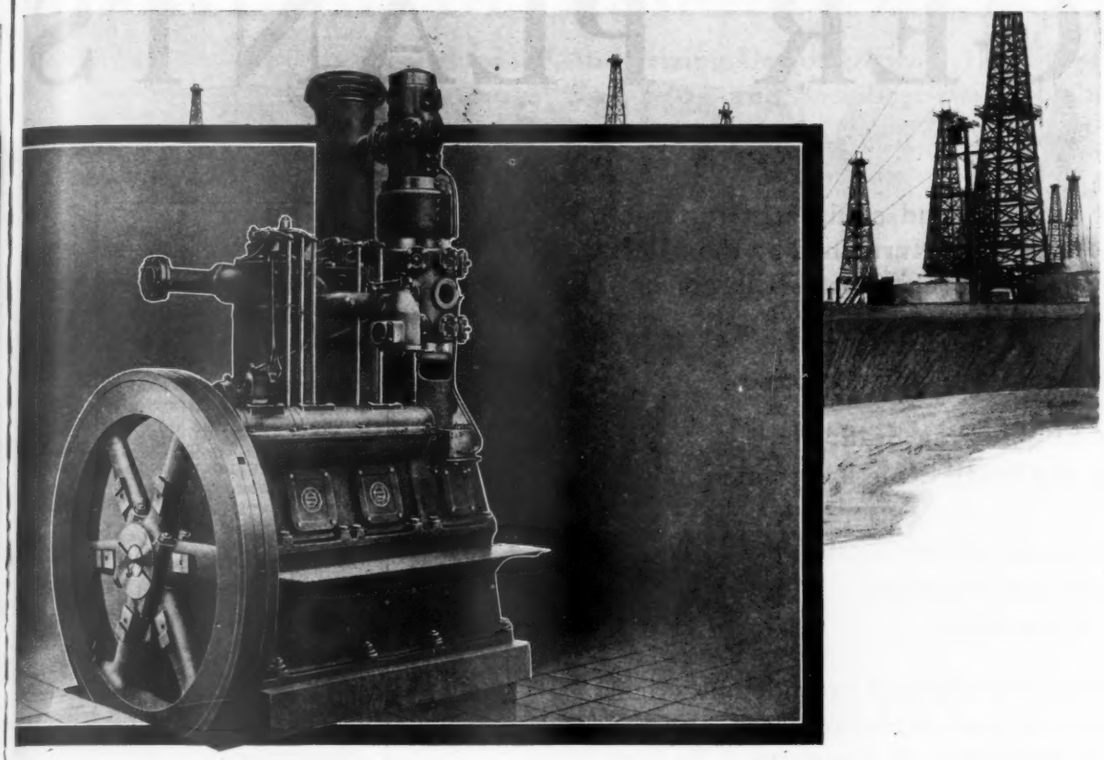
CHICAGO PNEUMATIC TOOL

Sales and Service Branches

6 East 44th Street

Higgins Bldg., Los Angeles

Whealton & Townsend, Inc.,
120 East Brady St., Tulsa



Oil Field Service

CP Compressors are available in all types and sizes, for flowing of wells, gasoline extraction, gas boosters, pipe line construction, tank farm construction, etc., powered by Oil, Gas or Steam Engines, Direct Connected Electric, or Belt Drive. The units are flexible—easily and quickly adapted to changed conditions. Liberal stocks of complete machines and parts carried at convenient points.

Purchasers of CP Compressors and Engines obtain well seasoned products, modern in every respect, and receive complete technical service in their selection and installation. The wide range of CP units enables you to center your entire compressor requirements in one manufacturer if you should so desire.

OIL FIELD EQUIPMENT:

Compressors for flowing of wells. Vacuum Pumps, Condensers and Compressors for Refinery Service.
Gas Compressors for Pressure Boosting.
Diesel Engines, 80 to 450 h.p.
Gas Engines, 90 to 540 h.p.
Portable Oil and Gasoline Engine-powered Air Compressors for cleaning wells and tank farm work.
Pneumatic Riveters, Chippers, Caulkers, Scalers, Drills, Reamers and Grinders to handle every portable tool job.
Rock Drills and Clay Diggers for pipe line trench work.

International Petroleum Exposition, Tulsa, Sept. 24th to Oct. 1st.

M-10

PNEUMATIC COMPANY

All Over the World

New York, N. Y.

Authorized Distributors

210 So. Jefferson St., Dallas

1415 Fannin St., Houston

BADGER PLANTS

THE Badger Systems and equipment for fractionating petroleum are furnished by the oldest and largest builders of efficient distillation apparatus in the United States.

Badger Service is complete and comprises:

Competent Engineering Staff.
Laboratory and Small Scale Experimental Plants.
Manufacturing and Construction.
Organization and Facilities.
Operating Supervision.

Badger Systems are the result of extended practical experience, extensive and careful research, and the most efficient engineering. A guaranteed Badger plant costs less for the same results than substantially any other system.

The following Companies are some of those who have purchased BADGER Equipment:

MAGNOLIA PETROLEUM CO., OF TEXAS
ROXANA PETROLEUM CORP.
CRAIG OIL CO.
FREEDOM OIL WORKS CO.
WHITE STAR REFINING CO.
GULF REFINING CO.
SKELLY OIL CO.
PHILLIPS PETROLEUM CO.
PIERCE PETROLEUM CORP.
TIDE WATER OIL CO.
ANGLO-PERSIAN OIL CO., LTD.
EMPIRE REFINERIES, INC.
MARLAND OIL CO.
McMAN OIL & GAS CO.
ASSOCIATED OIL CO.
BARNSDALL CORP.
HUMBLE OIL & REFINING CO.
TIDAL REFINING CO.
STANDARD OIL CO., OF N. J.
GENERAL PETROLEUM CORP.
BEACON OIL COMPANY
LUBRITE REFINING CO.
PENNZOIL COMPANY
SHELL COMPANY OF CALIFORNIA

TOPPING PLANTS
FRACTIONATING TOWERS AND SYSTEMS
PIPE STILL UNITS
TREATING PLANTS
LUBRICATING OIL DISTILLATION AND REFINING SYSTEMS
NATURAL GASOLINE RECOVERY PLANTS
COMPLETE REFINERIES AND REFINERY EQUIPMENT

E. B. BADGER & SONS COMPANY

BOSTON, MASS.

New York Ann Arbor Los Angeles Kansas City Tulsa

Functions of Standardization Division

Procedure for Authorizing Use of Official A.P.I. Monogram. Gauge Control and Specifications Explained

By C. A. Young
Director, Division of Standardization, American Petroleum Institute.

While the use of American Petroleum Institute Standard Specifications is primarily a transaction between the buyer and the seller, the Institute performs a very necessary function to assist in making these standards effective and a brief description of some of these activites may be of interest.

The organization of the committees, their appointments and functions are generally understood. The standardization program of the Institute embraces ten classes of materials, each of which is handled by a special committee appointed for that purpose. Each committee is headed by national officers, and is made up of regional and functional sub-committees on which are representatives of both users and manufacturers. Service on these committees is purely voluntary, in as much as the entire American Petroleum Ins itute standardization movement

C. A. YOUNG
Director, Division of Standardization, American Petroleum Institute

is essentially co-operative. The Institute provides the machinery for printing and circulating the results in convenient form. It endeavors to act as a clearing house for the details that overlap and require correlation, and assists in framing the recommendations of the committees in specification form.

Purpose of A.P.I. Monogram

One of the first recommendations from these special committees requring official action by the Institute was the selection and adoption of a marking device by which products made in accordance with American Petroleum Institute specifications could be identified readily in the field. A monogram was designed incorporating the initials of the Institute—"A.P.I."—as shown.

The size of this monogram may vary, depending on where and how it is used. For example, on cable drilling tool joints, the official size is one-half inch high; on pipe, it is one-fourth inch, and on couplings, from one-fourth to one-half inch; on rotary drilling taper joints, one-half inch; on rig irons, one-half inch on forged material and 1½ inches on cast material; on boilers, 1 inch; on working barrels, one fourth inch, and on flange connections for internal combustion engines and clutches, one-half inch on forged material and 1½ inches on cast material.

Ths monogram stamped on the material is an assurance to the buyer that the material so stamped is manufactured and tested in accordance with specifications that have been formulated, approved and adopted by a special American Petroleum Institute committee, representative of both manufacturers and users.

In order that all specifications, when issued by the Institute, can be identified as "official" the design of monogram shown is used.

Procedure Followed in Securing Permission to Use the A.P.I. Monogram

When a manufacturer is prepared to furnish material in accordance with American Petroleum Institute specifications and on which the use of the American Petroleum Institute monogram is authorized, and desires to use the monogram, he makes out an application in the following form:

(Sample)

Application to Use Official Monogram of The American Petroleum Institute

The American Petroleum Institute,
250 Park Avenue,
New York City.

Gentlemen:

In consideration of the American Petroleum Institute granting us the right to use the official monogram of the American Petroleum Institute in the manufacturing of Cable Drilling Tool Joints (2 by 3—7 Gauge) we agree that the use of this monogram is a representation that material so marked complies with all of the conditions and specificatons contained in the official publication of the Institute entitled A.P.I. Stds. No. 3, Second Edition, "Specificatons for Cable Drilling Tool Joints" including any amendments or modifications that may hereafter be adopted.

We further agree that no material which fails to comply with specifications shall be so marked.

A. B. COMPANY.
By John Doe.

County of Hudson, State of Ohio, ss.:

Acknowledged and sworn to before me June 3, 1926.

JOHN JONES,
(Seal) Notary Public.

This application is forwarded to the Division of Standardization at Dallas and the Institute thereupon issues to him the right to use the monogram in the following form:

(Sample)

Original No.....

American Petroleum Institute

Certificate of Authority to Use Official Monogram

The American Petroleum Institute hereby grants to A. B. Company the right to use the monogram shown as specified in official publication of the American Petroleum Institute, entitled A.P.I. Stds. No. 3, Second Edition, "Specifications for Cable Drilling Tool Joints," adopted by the Board of Directors on October 20, 1924, including any amendments or modifications that may hereafter be adopted, with the understanding that the use of this monogram is a representation that the material so marked complies with the said specifications, and provided further, that no materials which fail to comply with said specifications shall be so marked.

The American Petroleum Institute reserves the right to revoke this license to use the above monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

Issued at New York, June 10, 1926.
(Seal) American Petroleum Institute.
(Signed) W. R. Boyd,
Assistant General Secretary.

It will be noted that the privilege to use the A.P.I. monogram depends on the assurance from the applicant that he will comply with the published specifications that have been issued, including any revisions or amendments that may thereafter be adopted, on the particular product he desires to make.

The Institute provides no official machinery for the inspection of material in the various shops or mills. Compliance with A.P.I. specifications is strictly the manufacturer's responsibility. This responsibility is well understood by the manufacturers and, in our opinion, the trade can safely assume that no intentional violation of the specifications will be attempted by any responsible manufacturer. The Institute reserves the right to revoke the license to use the monogram for any reason satisfactory to its board of directors.

Gauge Control

When the specifications for cable drilling tool joints were adopted, the committee handling that particular subject recommended that the Institute own and

J. E. STILLWELL
Assistant to the Director of Standardization, A.P.I., Dallas, Tex.

control a set of grand master gauges to be deposited with the Bureau of Standards in Washington and to be used only in case of dispute. This committee also recommended that three sets of Regional Grand Master Gauges be deposited with official custodians in the Eastern, Mid-Continent, and Western Districts of the United States, so that for a reasonable fee the various manufacturers could have their Master Gauges checked from time to time in order that they may be maintained to standard. These recommendations were carried out and in accordance therewith, Grand and Regional Grand Master gauges have been purchased and deposited as follows:

Grand Master Gauges — Bureau of Standards, Washington, D. C.

Regional Grand Master Gauges, Eastern District—Pittsburgh Testing Laboratories, Pittsburgh, Pa.

Regional Grand Master Gauges, Mid-Continent District—Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.

Regional Grand Master Gauges, Western District—Smith-Emery Co., 245 South Los Angeles Street, Los Angeles, Calif.

American Petroleum Institute standards have been established on 11 different sizes of cable drilling tool joints; con-

Earnest Effort on Part of All Users Needed to Aid Movement

By F. V. FAULKNER
Manager, Magnolia Petroleum Co.

I thoroughly believe that standardization as outlined by the American Petroleum Institute cannot help but be a great benefit in the oil industry.

So many of the tools and appliances used in the oil industry have been made in the past in a haphazard way because manufacturers had no specifications to work to, but followed dimensions that best suited their convenience. All this has been changed under the American Petroleum Institute code, and many fittings and tools of different manufacturers' makes are exchangeable as regard to parts, etc.

The danger of retarding improvement is remote. While standardization will at some point retard development, I do not believe that point has been reached or passed. Casing and pipe had not been improved or have sizes changed in 35 years, and was being manufactured by the different manufacturers, each using a different gauge not made to any standard.

It is very apparent to all that a better grade of casing for oil wells has resulted by the American Petroleum Institute's effort in that direction. In the last two or three years, strings of casing 1,000 feet longer than was previously used have been used, and but very little trouble experienced. Nothing in the oil country causes a greater loss of time and money than defective casing. An earnest effort on the part of all users is needed to encourage and make a success of this movement, which was begun by the American Petroleum Institute in regard to standardizing material.

sequently, there are 11 A.P.I. Grand and Regional Grand Master Gauges deposited with each of the custodians listed. These A.P.I. Grand and Regional Grand Master Gauges were very carefully made. They were selected from a large group as the closest of the lot to the theoretically perfect. They are of special steel, hardened and ground. Special regulations have been adopted covering their storage and use.

The same system as described above is being followed on gauges for Rotary Drilling Taper Joints and will be utilized for other material when necessary and advisable.

On Sucker Rods, one set of Grand Master Gauges only will be provided which will be deposited at the Bureau of Standards in Washington. There will be no Regional Grand Master Gauges on Sucker Rods.

On tubular goods no Grand Master Gauges are necessary as the Bureau of Standards in Washington must certify the dimensions of each Master Gauge and can do so without the use of Grand Master Gauges.

Mid-Continent District Custodian

The following illustration shows the method followed by the Mid-Continent custodian in checking cable drilling tool joint gauges. The custodian uses three different checks, as by checking one method against the other, they can make more careful inspections than by adopting one operation as a standard.

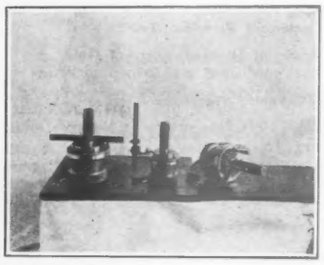


Figure 12—The figure at the left shows the method of taking the stand-off values with a measuring block; the middle figure shows the same operation using a height gauge; the figure at the right shows a similar check by the use of micrometers.

Testing Gauges
Bureau of Standards

The following photographs from the Bureau of Standards, Washington, D. C., illustrate the set of American Petroleum Institute Gauges for Cable Drilling Tool Joints, on deposit there; they also illustrate the manner in which the American Petroleum Institute pipe gauges are checked by the bureau as well as some of the special equipment used in calibrating gauges.

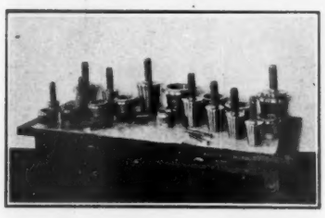


Figure 1—The complete set (11) A.P.I. Grand Master Gauges for Cable Drilling Tool Joints, at Bureau of Standards.

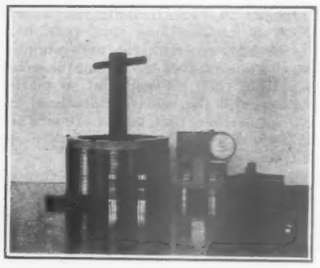


Figure 3—Measurement of lead or pitch of thread—A.P.I. Casing Plug Gauge, at Bureau of Standards.

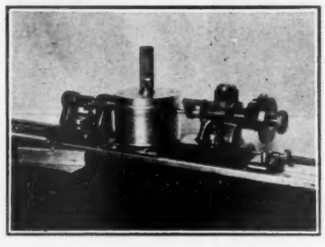


Figure 2—Measurement of pitch diameter—A.P.I. Drill Pipe Gauge, at Bureau of Standards.

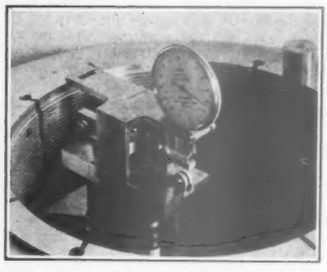


Figure 4—Measurement of lead or pitch of thread—A.P.I. Casing Ring Gauge, at Bureau of Standards.

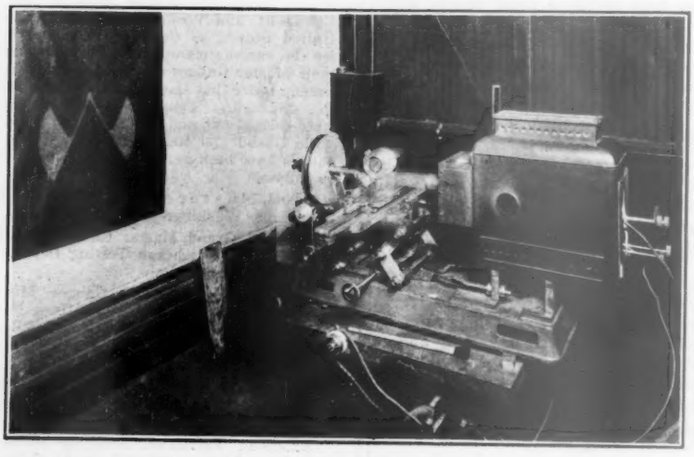


Figure 5—Measurement of thread angle—A.P.I. Upset Tubing Plug Gauge, with screw-thread Projector, at Bureau of Standards.

Eastern District Custodian

The following photographs illustrate the procedure followed in checking a set of manufacturer's gauges for cable drilling tool joints sent in for test to the Eastern District custodian:

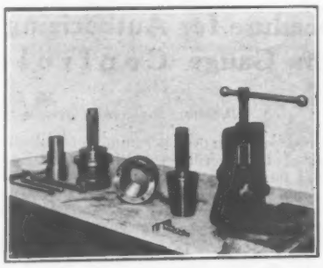


Figure 6.

Figure 9.

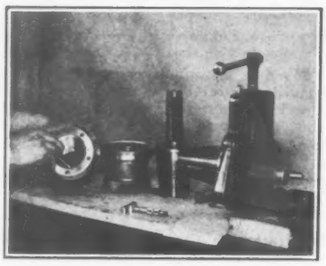


Figure 7.

Figure 10.

Figure 8.

Figure 11.

Custodian Reports

A report is made by the custodian giving the results of tests on each gauge, one copy of which is sent to the owner of the gauges, one copy to the American Petroleum Institute, Division of Standardization at Dallas, Tex., and one copy is retained by the custodian. This report is made in the following form:

Test of .....Cable Drilling Tool Joint

Reference Master Templates

Owned by .....
Size ..... No. .... Date .....
Projection from A.P.I. Gauge No.....
Of Ring or Shell of Template .....
Of Plug or Pin of Template .....
Record of templates to be tesed:
Projection before testing with A.P.I. Gauges .....
Tested by .....
At .....
Per .....
(Original for owner of gauge)

Report Records

An individual record is kept in the American Petroleum Institute office at Dallas, of each Master Gauge purchased by every licensee, on which the data from the custodian's reports are posted. In this way, a record is kept of each test and a definite pedigree is established for each gauge that has been purchased. When a gauge exceeds the permissible projection limits contained in the specifications, it must be corrected. Means for making this correction have been provided for in the construction of the gauges by the addition of special fitting plates. This Master Gauge record form is as follows:

Official Record

Of .... Reference Master Gauge No.....
Owned by .....
Date .....
Checked with A.P.I. Gauge No. .....
Custodian .....
Projection of ring .....
Projection of plug .....
Projection of template before testing.....
Report issued by .....

Companies That Have Been Licensed to Use the A.P.I. Monogram

A total of 140 companies have been licensed to date to use the A.P.I. monogram on the various products made in accordance with American Petroleum Institute specifications, as follows:

Oil Country Tubular Goods 32
Cable Drilling Tool Joints 50
Rig Irons 11
Boilers 10
Line Shafts for Rotary Drilling 2
Chain 8
Rotary Drilling Taper Joints (17 have indicated their desire to be licensed).
Sucker Rods—Specifications just being issued. (Approximately 10 companies have indicated their desire to be licensed.)

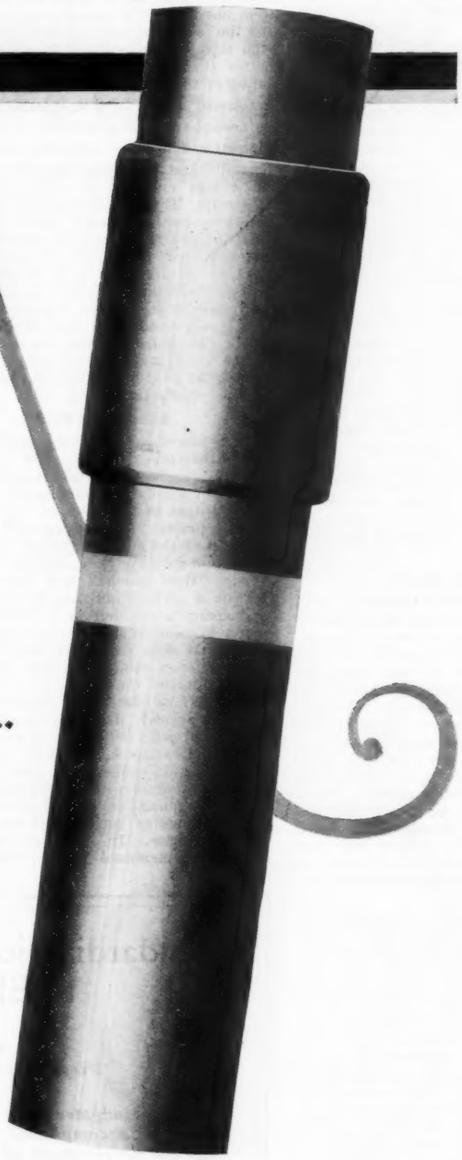
Value of Gauges Purchased to Date

Over $500,000 has been expended to date for A.P.I. "Master" and "Working" Gauges, divided approximately as follows:

"Master" Gauges completed to date, all kinds $200,000.00
"Master" Gauges for Rotary

(Continued on Page 306)

YOUNGSTOWN



Made to A. P. I. Standards and Specifications in all Types and Sizes.

"If CONTINENTAL Sells It, There Is No Better"

THE CONTINENTAL SUPPLY COMPANY

General Offices: St. Louis
Export Office: 74 Trinity Court, New York
London Office: 316-317 Dashwood House, Old Broad St. E. C. 2.

THE CONTINENTAL SUPPLY COMPANY, LTD.
69 Thomas Block, Calgary, Alberta, Canada.

CONTINENTAL

The Purchasing Agent's Viewpoint

First to See the Need for Standardization, They Urge Prompt and Universal Adoption

By G. A. Tompson,
President, The Purchasing Agents Association of Tulsa.

The writer has discussed with many oil purchasing agents the American Petroleum Institute's standardizaton program, and has never yet found one unfavorable to it as a whole. There may have been specific points on which they were not in agreement with a certain committee's standards, but they were wholehearted in their belief in the principle. The writer, therefore, has the right to assume that the purchasing agents of the oil industry are unanimous in their belief in and support of the program of the institute. Morever, their interest in this subject is not recent. Before the institute became active on standardization the Tulsa Purchasing Agents Association made, the writer believes, the first organized attempt towards standardization of oil field equipment when in 1921, in conjunction with manufacturers, they formulated standard specifications for rig irons.

The job was entirely too big for the purchasing agents. Our work met with little success. Our zeal in a good movement may have been commendable, but our judgment was poor when we decided we could establish the use of standard specifications. Probably we helped arouse some interest in the matter. What a movement of this magnititude really needed was executive support. Only an organization like the American Petroleum Institute could give it that, and therefore the purchasing agents were very glad to see the American Petroleum Institute take up this work.

Aid to the Buyer

Probably next to the executives and the men in the operating departments who use the materials, no one in the organizations of the oil companies is more intimately concerned in this program than the purchasing agent. Much of the grief incident to multiplicity of specifications falls upon the buyer. Imagine how much simpler it is to supply a broken rig iron part when the dozen or more manufacturers are making all of their rig irons to the same specifications. It is worth considerable to be able to buy another brand of pipe necessary to finish out a string with the feeling that you have every assurance that it will make up satisfactorily with the partial string that you already have.

Storing and handling the material often falls under the supervision of the purchasing agent, and the elimination of the diversity of specifications also simplifies this problem. When standard specifications exist fewer bins will be required; material can be inventoried more rapidly; less stock of certain items will be required; it will eliminate the possibility of the storekeeper sending out a part to the field that is of approximate specifications of another manufacturer, and therefore will not fit for the service desired. And so, we could continue on naming different kinds of troubles and expenses incident to lack of standard specifications, and we would find that the purchasing agent is fundamentally involved in all these difficulties.

But the troubles and griefs incident to the buying, storing, and handling where a multiplicity of specifications exist, is not the only or chief reason why purchasing agents favor standardization. They see in it a possibility of getting greater value for the dollar which they have to expend for their company. The wide-awake purchasing agent of today is not interested in buying at merely the lowest cost per unit without thought for other factors. He is primarily interested in expending his company's money where the quality, service, and price of the vendor will return the greatest value.

Difference in Products

A good buyer does not believe that standardization will eliminate all the differences in the products of manufacturers. There will still remain good manufacturers and those that are not so good; those that interpret the specifications in such a manner as to make the very best item possible while manufacturing within the limits of the specifications, and those who skimp their product and make it no better than necessary to fall within the limits of the specifications.

Careful thought and discrimination will be needed from all who have to select the materials for their company, as in the past. Standardization, however, has set up a new criterion by which to judge materials. The specifications for pipe, for instance, are somewhat more exacting than the generally accepted practices that have existed heretofore in pipe mills. And so it might be said of all of the standard specifications that have been set up. Specifications are somewhat better than the average that have existed in the past. This helps to raise the entire level of the quality of oil field materials, and in this the good buyer, like the good operator, is vitally interested.

Effect on Prices

In a preceding paragraph it was mentioned that other factors, such as quality and service, should not be subordinated to price, but surely the purchasing agent is concerned as to the effect of standardization on prices. It has been said that 90 per cent of the conversation of some purchasing agents is conducted in four words, "How much?" and "Too high." This is a serious indictment against the purchasing agent, but in his defense the writer hastens to say that the purchasing agent that does not bring into full play fair and open competition has not rightfully protected the interests of his company. What effect will standardization have on prices? In many cases the industry will get a better and more satisfactory article at no higher price. In other instances it is conceivable, with the general adoption by the companies, that through elimination of the diversity of designs a better article may be secured at a less price. In instances where the prices are increased beyond what they were under former specifications the improved product should more than offset the increases in prices. These factors just enumerated will require the serious consideration of the purchasing agent and other members of his organization.

G. A. TOMPSON

Improvement Gained

In addition to the benefits that will be derived from the full acceptance of standardization by the industry, there are benefits that have already been received that may be rather intangible but are really important. We have had some of the best brains of the oil industry and the manufacturers who serve it working together studying the needs and possible improvements of oil field equipment, and out of this has come, no doubt, many of the decided improvements in oil field materials that the past two years has brought. Focusing the thought of many men in the industry and many men manufacturing and selling to the industry on the importance of these problems would naturally bring many benefits to the industry.

The work done thus far is very commendable. In most committees their work has progressed to a point where the specifications are no longer tentative but are definite, and manufacturers may be chartered to use the American Petroleum Institute monogram. No doubt, in the earlier stages, many thought when we had reached this point that the big job would be done. This is not true. The biggest problem still remains; namely, universal adoption of these standards by the manufacturers and purchasers. No doubt the manufacturers will make supplies to these specifications as rapidly as they see a definite demand for them.

It is true, the manufacturers had a part in making these standards, and they should actively support them, doing all they can to encourage their adoption. On the other hand, the oil industry itself had an even greater part in the making of these specifications, and they should, as rapidly as conditions in their own companies permit, make it known in very definite terms to the vendors supplying the industry that they expect them to be prepared to fill their requirements with American Petroleum Institute standard specifications. With the thought in mind that the oil purchasing agents will be the medium through which the desires of their companies will be transmitted to the supply companies, and that the purchasing agent will be an important unit in helping to adopt and maintain these standards, we considered it timely that we inject ourselves actively into the work. Consequently, the Oil Buyers, at the last meeting of the National Association of Purchasing Agents, asked that a purchasing agent be given an appointment on each subcommittee of each district, and thereby keep fully informed as to new developments, and be in better position to help perform this service for the industry.

Buyers Represented

This action was approved by the Institute and thus far appointments have been made of a purchasing agent on each of the Mid-Continent subcommittees and on most of the Texas subcommittees. By the next annual meeting in December the purchasing agents will probably have representation on every committee.

We believe to secure adoption of these standards needs, first, the same enthusiastic executive support that the movement originally received when making these standards. Second, it needs the cooperation of its operating, engineering, and purchasing departments to make the idea fully effective.

Some of the specifications will not be at all difficult to adopt. This applies particularly to those materials where the new standards will not cause any difficulty in using with equipment now owned. All that is needed is the decision to use it, and then to make a firm demand of the vendors to carry stocks to fill the requirements. On the other hand, certain items, particularly tubular goods, present a difficult problem. It will require judicious handling in many cases to make the change without loss. It is very important, however, that the men who have to do with the selection of materials in their organization give serious thought as to how and when they can begin using standard specifications, and thereby secure their general use, and make possible the tremendous savings that standardization will bring to the industry.

Standardization Gives Chance to Eliminate Economic Waste

By W. G. SKELLY
President, Skelly Oil Co., Tulsa, Okla.

In my judgment, the American Petroleum Institute has undertaken and accomplished no more important and far-reaching work than the development of standardization in oil field equipment.

The producing branch of the oil industry has often been accused of waste and wasteful practices. Actual physical waste of oil has been noticeably slight, but the industry has been guilty of wasteful economic practices, none more noticeable than that resulting from the almost complete absence of any semblance of standardization in tools and equipment used.

Happily, through the institute's standardization work, carried on during the past five years and now approaching completion, our industry is confronted with an opportunity to rid itself of this unsound and uneconomic condition.

Standardization, universally adopted, will reduce our costs by; (1) increasing the length of life and consequent service secured from materials and equipment of better design and quality; (2) increasing efficiency through greater interchangeability of materials; (3) reducing inventories of warehouse stocks by reducing variety of materials needed; (4) increasing the value of such salvaged materials, on account of their greater interchangeability.

WESTCOTT

[DRILLING GATES PIPE LINE VALVES]

Face-to-Face Dimensions Made to A.P.I. Standards

Since WESTCOTT Valves are designed and built exclusively for oil industry use, by engineers who are constantly studying oil field requirements,—it was natural that these valves should be among the first products to conform to A.P.I. standardization specifications. WESTCOTT Valves, in both screw-end and flanged-end types, are made in strict accordance with A.P.I. Standards for face-to-face dimensions.

We offer a complete line of WESTCOTT Pipe Line Valves and High-Pressure Drilling Gates, in all sizes.

"If CONTINENTAL Sells It, There Is No Better"

THE CONTINENTAL SUPPLY COMPANY

General Offices: St. Louis

Export Office: 74 Trinity Court, New York

London Office: 316-317 Dashwood House, Old Broad St., E. C. 2

CONTINENTAL SUPPLY COMPANY, LTD.
69 Thomas Block, Calgary, Alberta, Canada

CONTINENTAL

Automotive Industry Standardization

Conservative Estimate of Saving to Public and Business During 1926 Is Placed At $300,000,000 Per Annum

By H. L. Horning
President, Waukesha Motor Co. and Motor and Accessories Manufacturing Association.

There is no progress without change. The outstanding progress of modern times has been the advance in science and industrial arts. Progress has been so rapid and so all inclusive that some details of construction on which tremendous amount of experience is available and which has been converging naturally toward a common type must be standardized or progress in the more essential features can not proceed.

Economic necessity dictates standardization. Modern production methods divide operations into their very elements. This promotes the formation of correct habits in working men which is recognized as the foundation of speed and accuracy. On the other hand, the management can safely put at the service of each man all the labor-saving devices which the operations deserve. Standards promote production by helping to form habits.

Saving in direct costs by standardization always appeals to the less analytical, but there are secondary indirect and intangible savings which are none the less valuable and in most cases are of vastly more importance than the primary savings. The production of bolts with standard threads is a primary saving in cost, simplicity, etc., while the advantage of assembly and reduction of service stock, field convenience, is an illustration of the secondary advantages of standardization. There is a third division of saving; namely, both shop and field methods may be studied and developed when certain items are fixed by standardization and all parties involved can exhaust the innumerable possibilities of human ingenuity when its is known no changes will make obsolete equipment or methods. Special production tools for productive and field service belong to the third division of saving.

Standards Like Habits

Standards are to industry what habits are to human nature; they release the attention for other more important matters. As established by the Society of Automotive Engineers for the automotive industry, standards are adopted voluntarily by the various companies, and this has been found the only practical method. Compulsory standards are hard to establish and difficult to enforce. For any common mechanical device there is a design which eventually by common though unconscious consent becomes standard. The standardization by organizations is merely quickening this natural process by intelligent choice and concerted action with most of the pertinent information available for calm consideration.

There are two processes of evolution going on in any common mechanical device: an increase in utility by an addition to this function, or spreading the field of usefulness by adding to the design. Thus, from time to time a design gathers useful features, custom changes, and these additions may become useless though they may cling to the device by mere force of habit.

On the other hand, compromises to simplify come about for reasons of cost. Standardization weighs these considerations and finally strikes a happy economic balance.

Economics demand that industries establish methods, habits, customs, and standards to hold for a time and to allow progress to be made in other elements of design, while information is growing on broad uses of the established standards and out of this experience develops information for new standards.

Automotive Experience

The automotive industry, the giant of modern industries and only a quarter century old, foresaw the facts outlined above in the very beginning. Automotive standards have been developed by the Society of Automotive Engineers, and the National Automobile Chamber has helped to finance the movement.

Today the society has 400 standards established and in operation. There are 221 members from most of the prominent companies on this standards work of the Society, and there are 22 standards divisions. There are 250 members on 46 subdivisions of the standards work. There are 13 active members acting as representatives of the society on 52 sectional and interindustrial, international, and other committees.

Simplification, which is closely related to standardization, consists in eliminating unnecessary sizes, types, or models, and this has been fostered by the Society of Automotive Engineers with the elimination of tremendous waste in the industry. Innumerable examples may be quoted where sizes have been reduced to less than one-fifth by the elimination of unnecessary, low productive and less profitable sizes.

It would be impossible to estimate the savings to the automotive industry and to the public arising from the every effective standardization which has been generally accepted by the industry. A committee of very conservative and representative men has come to the conclusion that a saving of $300,000,000 per annum represents as close an estimate as can be made of the savings to the public and the industry from standardization in the year of 1926.

Process of Standardization

The process of standardization is not a simple one; each case calls for the calmest and most thoroughgoing investigation, foresight, and judgment. After 20 years of successful standardization, the Society of Automotive Engineers appointed a policy committee on standardization. The committee consisted of past presidents of the society and other thoroughly competent and active members from successful companies. The object of this committee was to take the past performance and in view of long experience lay down the principles and policies which had been found sound and practical in the formation of standards.

After two years of careful consideration of this subject, the following policies were set forth by the committee:

The purpose of the standardization policy committee is to define the general policy of the society's standardization activities and to act in an advisory capacity with the divisions of the standards committee on subjects involving questions of policy.

Specifications may be standardized to:

(1) Promote interchangeability of parts and units.

(2) Eliminate unnecessary variety of parts and materials.

(3) Facilitate production and maintenance.

(4) Promote uniform methods of testing.

(5) Establish nomenclature and standardize tests of performance or operation.

(6) Set up standards or codes for promotion of safety.

Standardization of specifications shall not place unnecessary limitations or restrictions on individuality of design, construction, performance or operation.

Must Be Desired

Specifications shall not be standardized unless there is sufficient desire for such standards expressed by the industries affected.

The fact that patents or protective rights may relate to a device, material or process does not preclude setting up specifications for such subjects. Where a patent right is known to be involved in standardization a specification, the subject should be referred to the patents committee for consideration and recommendation as to procedure.

The above policy of standardization, I believe, represents the best and safest practice, and perhaps covers a longer period than any other effort of its kind. That it has contributed to the success of the industry is without doubt. Subject to conditions peculiar to the petroleum industry I suggest it as a valuable guide to the work so well begun.

In every industry there are primitive minds—those whose wills are ruled by pride or other consideration, who withhold support from standards. This is where the voluntary method works out its ends. Standards which depend on voluntary adoption have to be good and be kept good. They have no imperial edict to support them; only their virtue and value sustains them.

Gear Shift Example

A situation arises in all industries similar to that which has been brewing for some years in the automotive industry, the question of gear shift, until finally in January, 1927, four cars still had out-of-standard gear shifts. They were the largest units in the industry. One of them had no sliding gears at all. The economic value of a standard shift worked slowly and surely like the Colorado River wearing down mountains to form the Grand Canyon. By January, 1928, all four of these cars will have standard gear shifts. Sales resistance did the trick. The public demands good standards.

In a deeper sense, standards are the law of evolution working out in the industrial arts. That form which best adopts itself to a service survives as a standard. Those who aid the process of standardization are the Luther Burbanks who deal in the sphere of human nature and economics instead of fruits and flowers, and by careful selection and trial evolve something better sooner than if left to natural selection. Standards are the best example we have of the survival of the fittest. What is more important—those who believe in standardization and practice it are the fittest and survive, and those who do not eventually pass out of the picture. The larger they are the more certain they are to fall.

There is no industry of rank which offers greater opportunity for saving by standardization than the petroleum industry. From geological methods of discovery to sale of gasoline at filling stations, the savings can be written in millions and can easily reach into the billions, depending only on the spirit and broad-minded manner in which the principle is accepted and put into practice. Our experience with the industry is such that makes us believe that only economic reasons will control the speed of adoption of standards.

Standardization Will Aid Oil Men As It Has Those in Other Trades

By E. W. CLARK
President, American Petroleum Institute

My early life was spent in railway and steamship transportation. I had the opportunity when I was a young man of participating in the original set-up of equipment and motive power of a short line railway in the State of Washington where we standardized everything. Just as an instance of what I mean—the wheels, axles, boxes, wedges and brasses, as well as all the other metal parts of a complete truck were standardized. In other words, you could take a truck from under a locomotive tender or from under a freight car of any kind, run it under a passenger coach where it would fit perfectly and perform its function just as well as the original coach truck did, the result being that the stock of repair parts we had to carry was reduced to a minimum and our maintenance cost on rolling stock was over 40 per cent less than it was on some other lines I have been connected with.

Comparable results may be obtained in the oil industry if operators will now adopt A.P.I. standards, but I realize how difficult it is to change the mental habits of the man who is called upon to exercise his energy to the fullest extent in getting work done quickly. Speed is the slogan in the development and production branches of our business and we frequently do not take time to stop and consider what are apparently on the surface small items of expense when our main object is to get a hole down before our neighbor gets his finished.

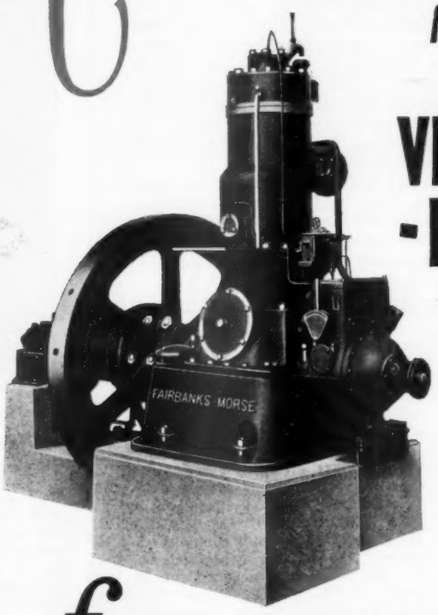
Our only resource as I see it, is to urge and keep urging a trial of our Standardization Committee's recommendations. This will surely result in saving of time and money to the operators. It will mean satisfaction and gratification to the men on this committee and its subcommittees, who have labored so long and faithfully in our behalf.

FAIRBANKS-MORSE

Now Available!

A DIESEL ENGINE

for beam well pumping and powers



VERTICAL DIESEL -HEAVY DUTY-

SIZES: 40, 60 and 80 H.P. (continuous rating).

WIDE SPEED RANGE (100 to 300 R.P.M.) under governor control.

SUCCESSFUL at low speeds. Long life at high speeds.

CLUTCH: Timken Roller Bearing Clutch, or O. C. S. Countershaft Clutch are optional equipment.

FOR PUMPING, SWABBING, DRILLING OR POWERS

—Using Crude or Fuel Oil

"If CONTINENTAL Sells It, There Is No Better"

THE CONTINENTAL SUPPLY COMPANY
General Offices: St. Louis, Mo.
Export Office: 74 Trinity Court, New York City
London Office: 316-317 Dashwood House, Old Broad Street, E. C. 2
THE CONTINENTAL SUPPLY COMPANY, Limited,
69 Thomas Block, Calgary, Alberta, Canada

CONTINENTAL

Standardization Work in California

Close Co-operation and Systematic Arrangement of Details Permits Operators to Keep in Touch with Work

By Edwin Higgins
Secretary, Chamber of Mines and Oil, Los Angeles

STANDARDIZATION IN CALIFORNIA

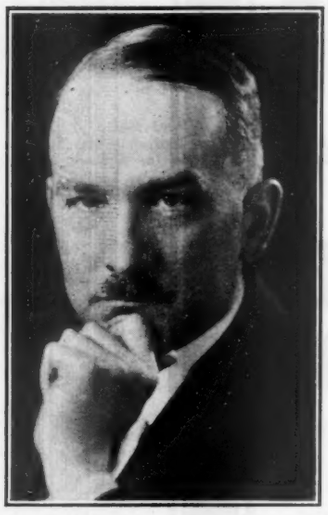
From its inception in California, the standardization work received the earnest consideration of both operators and manufacturers. Several factors contributed to the success of the movement. In the first place, the larger oil companies quickly saw the advantages to be gained through standardization and simplification. They became interested and many of them instructed their research departments to co-operate closely in the work. Another factor was the geographical distribution of the oil fields. As compared with other districts in the United States, the operations were fairly close together and practically all of the more important operators had offices in Los Angeles. Hence it was an easy matter to bring together the representative men of the industry. On occasions fully attended meetings have been held on only 24 hours' notice. An important item in the success of the movement has been the close co-operation between California operators and manufacturers, officials of the American Petroleum Institute, and the various committee chairmen in other sections of the country.

As to the value of the work accomplished to date, it is not possible at this time to set down definite figures. However, the companies interested have begun to see a large financial return as a result of their efforts. There have been many reports of direct savings by individual companies, but it will be a difficult matter for some time to come to arrive at even an approximate figure as to the total savings. One fact stands out prominently and that is the notable improvement in the quality of oil field equipment and increase in the drilling speed in the oil fields.

One benefit of inestimable value has been derived from the many conferences and meetings that have been held. The discussion of standards has been coincident with the exchange of operating experience and data that has been of great value to the committee members and, through them, to the companies which they represent.

The first move towards the establishment in California of the work of standardization of oil field equipment was made in 1922, on September 21 and October 14 of which year, J. Edgar Pew, vice president of the Sun Oil Co., Dallas, Tex., wrote to W. L. Stewart, president of the Union Oil Co. of California, at Los Angeles, asking that he co-operate with the work of standardization already started in the Mid-Continent Field and that he send a representative to a meeting to be held at Dallas in November of that year.

Under date of October 17, 1922, Chester W. Brown, director of Exploration and production of the Union Oil Co. of Cali-



EDWIN HIGGINS

fornia, wrote to Mr. Pew, stating that this correspondence had been referred to him in Mr. Stewart's absence abroad; that he would send a representative to the Dallas meeting as requested. On October 26, Mr. Brown advised Mr. Pew that R. M. Putman, manager of the Union Oil Co. of Nevada, then stationed at Graham, Tex., would attend the November meeting. On November 3, Mr. Pew wrote Mr. Putman advising him that the meeting would be held on November 13 at Tulsa and inviting him to be present. On November 16, Mr. Pew mailed to Mr. Brown copies of the minutes of the meeting of November 13. On November 18, Mr. Putman reported to Mr. Brown regarding this meeting. He referred to the pipe standardization committee, fostered by the Mid-Continent Oil & Gas Association, and set forth some of the details of the discussion that had taken place at the meeting regarding pipe specifications.

Institute Co-operated

In December, 1922, the American Petroleum Institute met at St. Louis and decided to co-operate in the work of standardization and simplification already under way. On December 20, Mr. Pew wrote to Mr. Brown, requesting that he act as Pacific Coast chairman of a general committee on pipe standardization. He also asked Mr. Brown to appoint additional members to the committee and to call a meeting at an early date.

On January 11, 1923, a meeting of prominent California operators and manufacturers was held under the auspices of the Chamber of Mines and Oil at Los Angeles. Mr. Brown brought up the subject of standardization and suggested that the chamber act as a clearing house in handling the work. The subject again came up for discussion at a similar meeting held January 25; there were 19 operators and manufacturers present. A. C. McLaughlin, of the Associated Oil Co., president of the chamber, was in the chair. Charles D. Terry, of the National Tube Co., gave a history of pipe standardization from the standpoint of the manufacturer. Recommendations for pipe specifications were discussed, but no definite action was taken at that time.

President McLaughlin was instructed to appoint a committee to co-operate with Chester W. Brown, to consider pipe standardization, as outlined by the American Petroleum Institute, and make recommendations to the institute, either directly or through general conference with the Mid-Continent operators. On this original committee there was appointed: Chester W. Brown, Union Oil Co. of California, chairman; Walter G. Black, Standard Oil Co. of California; T. J. Crumpton, Petroleum Midway Co., Ltd.; W. L. McLaine, General Petroleum Corp.; W. C. McDuffie, Shell company of California; F. F. Hill, Union Oil Co. of California; M. E. Lombardi, Pacific Oil Co.; W. B. Blodget, Chanslor-Canfield Midway Oil Co.; L. J. King, Associated Oil Co.; H. H. Hillman, National Supply Co. of California; J. B. Gocke, Marks Manufacturing Co.; E. W. Goeser, Emsco Derrick & Equipment Co.; E. M. Jones, Associated Supply Co. The first meeting of this committee was held January 30, and the second February 8, 1923. Many subsequent meetings were held.

Growth of Activities

The pipe committee, under the leadership of Chester W. Brown, but with slight changes in personnel, continued to function during 1923. At various of its meetings there were informal discussions of standard specifications for other items of oil field equipment.

On May 11, 1923, the pipe committee was called together to discuss with H. J. Lockhart, of the Parkersburg Rig & Reel Co., the work of the A. P. I. committee on rig iron standards. As a result the following California committee was appointed to make recommendations on this subject: C. C. Scharpenberg, Standard Oil Co. of California, chairman; T. J. Crumpton, Petroleum Midway Co.; W. L. McLaine, General Petroleum Corp.; F. F. Hill, Union Oil Co. of California; W. C. McDuffie, Shell company of California; L. J. King, Associated Oil Co.; W. B. Blodget, Chanslor-Canfield Midway Oil Co.; M. E. Lombardi, Pacific Oil Co.; Norval White, American Petroleum Institute; Thomas Collins, Pan American Petroleum Co.; Robert McGuire, Honolulu Consolidated Oil Co.; William Lehr, Montebello Oil Co., and W. M. Keck, Superior Oil Co.

On May 25, there was a joint meeting of the pipe and rig irons committees. J. Edgar Pew and Norval White were present. This meeting was productive of a better understanding of the aims of the American Petroleum Institute concerning the standardization of pipe, rig irons and other items of oil field equipment.

On October 30, 1924, Mr. Pew wrote to all district chairmen stating that "the final report of the pipe standardization committee has been submitted to the American Petroleum Institute's board of directors and has been accepted by them. There will be a meeting of the American Petroleum Institute at Fort Worth, December 9 to 13, at which there will be a complete standardization program. You will receive an outline of this program and I hope you will be present to participate in these meetings."

Mr. Pew further set forth that there had been constituted within the institute standardization committees to consider the following subjects: Rig irons, oil field boilers, cable tool joints, steel lines and cordage, belting, rigs and derricks, engines and pumping equipment, and rotary drilling equipment. He bespoke the co-operation of the California committee in the work to be done.

Reorganization and Extension

On November 21, 1924, the California committee on pipe standardization met to consider what had been accomplished by the committee and to decide on further activities. This body had already begun to function as a main committee, various subcommittees having been appointed to consider special details. After some discussion the following motions were passed:

"That the standardization committee (of California) on oil well equipment be

CHESTER W. BROWN

perpetuated and that it function through the Chamber of Mines and Oil."

"That Chester Brown (Union Oil Co.) act as chairman and that W. L. McLaine (General Petroleum Corp.) act as vice president of the main committee on standardization of the Chamber of Mines and Oil for the year beginning January 1, 1925, and that the chairman appoint chairmen of subcommittees, as occasion requires."

Mr. Brown then appointed the following subcommittee chairmen:

Wire Lines and Cordage—C. C. Scharpenberg, Standard Oil Co. of California; Rotary Drilling Equipment, (including rig irons)—F. F. Hill, Union Oil Co. of California; Pumping Equipment—W. L. McLaine, General Petroleum Corp.; Rigs and Derricks—J. J. Hern, Chanslor-Canfield Midway Oil Co.; Belting—J. A. Jones, Associated Oil Co.

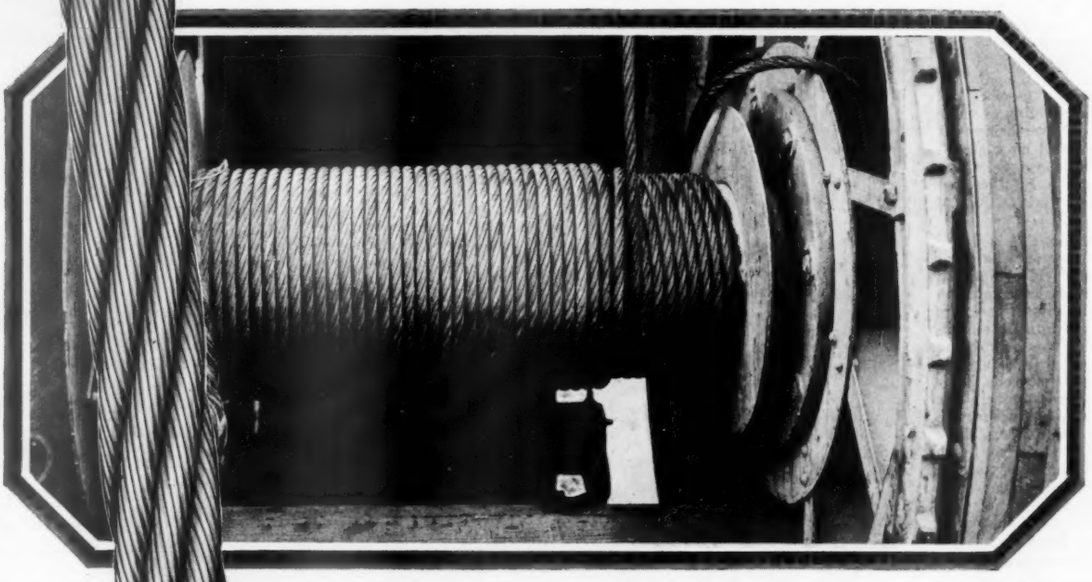
Thus the groundwork was laid and a system established on which the California standardization committees subsequently functioned.

Main Committee

The Main Standardization Committee, which functions also as the Pipe Committee, constitutes the keystone of the organization. From the members of the Main Committee are selected the chairmen of the various subcommittees. The subcommittee chairmen select the personnel of their respective groups. Prior to the semiyearly and yearly meetings of the American Petroleum Institute, these subcommittees hold one or more meetings, as the occasion requires, and arrive at definite recommendations. When all of the subcommittees have completed their work, a meeting of the main committee

(Continued on Page 324)

AMERICAN WIRE LINES



Wire Lines Exactly Suited to Every Oil Country Need—

American Steel & Wire Company wire lines lead in oil country sales because each type of line is scientifically designed for its special work.

By dint of long experience and untiring research we have determined the qualities essential in lines for cable tool drilling, for rotary drilling, for pumping, for bailing, etc. Unsurpassed manufacturing and testing facilities insure the proper combination of strength, flexibility, spring and durability in every line. Stocks carried at all Continental stores.

"If CONTINENTAL Sells It, There Is No Better"

THE CONTINENTAL SUPPLY COMPANY
General Offices: St. Louis
Export Office: 74 Trinity Court, N. Y.
London Office: 316-317 Dashwood House, Old Broad St., E. C. 2
CONTINENTAL SUPPLY COMPANY, LIMITED
69 Thomas Block, Calgary, Alberta, Canada

CONTINENTAL

Progress in Wire Lines and Cordage

Value of Proper Grooves in Wire Line Sheaves and Better Understanding of Bending Stresses Some Advantages

By C. C. Sharpenberg
National Chairman, A.P.I. Committee on Wire Lines and Manila Cordage.

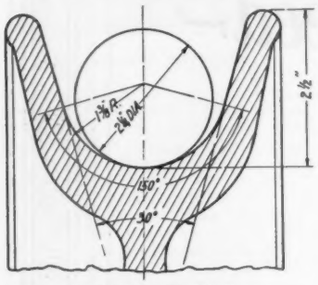
One of our earliest recollections is that of the doctor coming into our home. He came, diagnosed the case, and wrote his prescription. This prescription contained certain words and signs which were not legible to any of us, even the older members of the family. It was taken to the druggist who would readily fill it by selecting the drugs called for. I have never heard any statements regarding the means used by members of the medical fraternity in arriving at their method of procedure. Nevertheless, it would no doubt be classified as a standard method or simplified system which has been put into service by them to meet the needs of their work in saving and prolonging human life.

The oil industry, within the last five years has gathered together various users and manufacturers of oil field equipment, to the end that there shall be a common nomenclature, common points of measure and common values of strength for simplified design. The results are now being circulated in the form of printed specifications and with these as a basis, it is much easier to add progressively the changes in design, giving better service than we have received heretofore. There is no doubt, due to the steps so taken by the American Petroleum Institute that it is going to be a great deal easier to correct existing errors and greatly improve the understanding of such corrections by the entire oil fraternity.

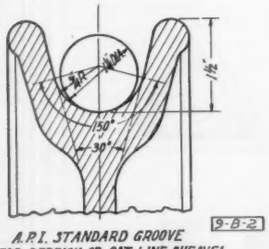
Some of the Advantages

The particular advantages which have accrued from the wire rope and manila cordage specifications are as follows:

The value of having the proper grooves in wire rope sheaves has been set forth and the use of hard or wear-resisting



A.P.I. STANDARD GROOVE FOR CROWN SHEAVES.



A.P.I. STANDARD GROOVE FOR DERRICK OR CAT LINE SHEAVES

steels or steel alloys has been accelerated by the investigations made to date. Records now available show that thousands of feet of hole can be drilled by rotary without the changing of sheaves when the grooves are properly designed by the manufacturer.

A more complete understanding of the effect of bending stresses in wire rope exists now than heretofore. The wire rope manufacturers have for some years past been attempting to eliminate or minimize both bending and crushing stresses. In order to properly accomplish this, the design of equipment over which wire rope is used, must be changed. This is being done wholeheartedly by many manufacturers of oil field equipment.

At the present time the first properly grooved rotary drum 25 inches in diam-

C. C. SCHARPENBERG

eter has been put into service and other manufacturers are designing and will soon have on trial other properly grooved drums.

Wire Line Stresses

Considerable study has been made by both wire rope manufacturers and users to determine the stresses imposed on wire lines in service. At a recent drilling well where wire lines gave short service, a strain of 42,500 pounds was observed on the line. To this should be added the bending stress on a 16-inch drum which is better than 16,000 pounds, making a total stress in excess of 58,500 pounds, whereas the line, new, is only guaranteed under the present A.P.I. standardization to have a total of 69,000 pounds breaking strain. This, of course, does not take into account all the factors and stresses to which it is possible to subject a wire line, but shows that a more complete understanding of the service conditions by many men using wire rope, in conjunction with advice and possibilities of design from the manufacturer, should be of great value.

M. H. BRODERICK
Wire Lines and Manila Cordage.

At one time the field men asked manufacturers that they remove all surface lubrication from wire rope, even though it was opposed by wire rope manufacturers. Today wire ropes are being received in the field properly lubricated by the manufacturer and additional lubrication is applied while the wire line is in service. This does prolong the life of wire rope and has a decided tendency to reduce the attendant accidents.

Records kept of the laboratory testing of wire lines in many cases show that they are more uniform today than in the past.

Attached to the A.P.I. specifications are Appendix A, which shows the recommended practice for the use and preservation of wire rope.

Appendix B shows the suggested improvements in design of oil field equipment to lengthen the life of wire rope.

Appendix C—Field troubles and their causes.

Never since wire rope has been used in the oil fields has such a complete set of recommendations been gathered together and this well bespeaks the favorable attitude of all our American wire rope manufacturers.

HARRY J. LESCHEN
Wire Lines and Manila Cordage.

WIRE LINE AND MANILA CORDAGE SPECIFICATIONS OF THE A.P.I.

(Tentative)
Including Recommended Practice for Proper Application and Use of Wire Rope in the Oil Country

The following tentative specifications for wire rope for oil country use have been developed after several years of analysis and study on the part of the special committee on standardization of wire rope and manila cordage, appointed by the board of directors of the institute. Careful consideration has been given to existing specifications in other industries, as well as to the results of research and tests conducted in the United States and abroad.

The committee has endeavored to include in these specifications those limitations which will eventually produce wire rope best suited to meet the difficult conditions obtaining in the oil country.

It should be borne in mind that these specifications are subject to such further additions and modifications as may be warranted by the future investigations of the committee. In order that the subject may be fully developed, it is important that these tentative specifications be put into practical use and that careful records of the service rendered be kept by the purchasers, so that definite and final specifications may ultimately be formulated.

If the purchaser does not inspect his wire rope either at the factory or elsewhere, he is particularly cautioned to preserve for test purposes the samples or specimens referred to in these specifications.

The purchasers are further requested to observe the recommendations contained in these specifications relating to recommended practice for the use and preservation of wire rope. If the objects of these specifications are to be attained, it is important that these recommended practices be followed carefully.

In order to lengthen the life of wire rope in the oil country, manufacturers of equipment are urged to consider the suggested improvements in the design of oil field equipment contained herein.

SECTION 1
Material Covered

1-a. Paragraphs 2 to 22, inclusive, of

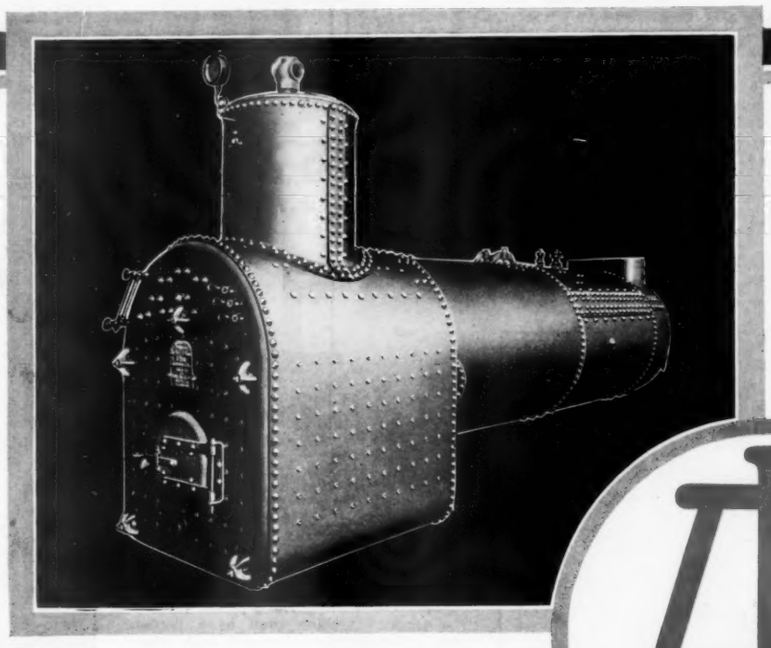
C. C. BROWN
Wire Lines and Manila Cordage.

these specifications, apply to wire rope for oil country use, including:

Cable tool drilling lines.
Cable tool casing lines.
Sucker rod and tubing lines.
Sand lines.
Rotary drilling or casing lines.
Rotary bailing lines.

1-b. Specifications for the following

ACME OIL WELL BOILERS



Exceed the Safety Requirements of the A.P.I. Code

Acme Oil Well Boilers are not only made to conform to the A.S.M.E. Code—adopted by the A.P.I. Standardization Committee—but materials are figured to give a large margin of safety over the minimum requirements of the Code.

These are the best steaming boilers on the market. They are designed to give a very high ratio of grate surface and heating surface, based on the rated horsepower. An adequate number of handholes are conveniently placed. Fittings are of the highest grade. All workmanship and materials are guaranteed first class in every respect. Offered in sizes from 25 to 100 H.P.

"If CONTINENTAL Sells It, There Is No Better"

THE CONTINENTAL SUPPLY COMPANY
General Offices: St. Louis
Export Office: 74 Trinity Court, New York
London Office: 316-317 Dashwood House, Old Broad St., E. C. 2
CONTINENTAL SUPPLY COMPANY, LTD.
69 Thomas Block, Calgary, Alberta, Canada

CONTINENTAL

lines are covered in Paragraphs 23 to 25-g, inclusive.

Galvanized Wire Guy Strands

1-c. Specifications to be added later for:

Torpedo lines.
Pumping lines.
Power pull lines.
Well measuring tapes.

SECTION 2

Grades of Material

2-a. Grade "J" shall refer to a good grade acid or basic open hearth steel of the physical properties hereinafter specified. (Otherwise called "plow steel.")

2-b. Grade "L" shall refer to a good grade of acid or basic open hearth steel of the physical properties hereinafter specified. (Otherwise called "extra strong cast steel.")

2-c. Grade "N" shall refer to an acid

G. H. KLINGLER

Wire Lines and Manila Cordage.

or basic open hearth steel of the physical properties hereinafter specified. (Otherwise called "cast steel.")

2-d. Lines composed of combination of two grades shall be permitted. The first letter referring to grade of outside wires, the second letter to grade of inside wires, each of which must pass the physical characteristics of the respective grades. For example: Grade "N. J." would mean that all outside wires are to be made of grade "N" and all inside wires to be of Grade "J."

SECTION 3

Properties and Tests for Wire

3. Selection of wires to be tested.

3-a. For tests of the wire in a rope a section shall be cut from a finished piece of unused and undamaged wire rope, samples to be taken within 30 days of actual delivery of the rope.

3-b. From each strand there shall be selected and tested certain wires as follows: The total number to be tested shall be equal to the number of wires in any one strand. They shall be selected from all strands of the rope. The specimens shall be selected from all locations or positions so that they would constitute a complete composite strand exactly similar to a regular strand in the rope. The specimen for all like positioned wires to be selected so as to use as nearly as possible an equal number from each strand.

(Note: Whenever "like positioned" wires are mentioned it will be understood to mean symmetrically placed in a strand. For instance, in Warrington all the outside wires are not necessarily "like positioned," since in the outside layer are placed alternately large and small wires. All large wires are "like positioned" with respect to each other and all small wires are "like positioned" with respect to each other.)

3-c. Any unsymmetrically placed wires or marker wires are to be disregarded entirely. Annealed heart wires not to be considered in averages, but must have a minimum tensile strength of 50,000 pounds per square inch; must stand a test of at least 60 twists as described under "Torsion Test" and a bending test as described under Paragraph 7, "Bend Test of Wires."

3-d. Each specimen except those for tension tests shall be carefully hand straightened.

3-e. The tests shall be so run and records kept in such a manner that the results of each of the various tests on any one specimen are associated and may be studied separately from other specimens.

3-f. In case of controversy the purchaser may at his expense test all of the wires.

3-g. If the first specimen fails to pass the minimum requirement for individual wires two more specimens shall be tested from the same wire, both of which must comply with the requirements for that wire. The average of these two tests to be used to represent that wire. This applies only to the wires in the selected composite strand as indicated in Paragraph 3-b of Section 3, except as provided for torsion test under 6-b.

3-h. In torsion tests the additional tests may be made at a reduced rate of speed, not exceeding 30 twists per minute.

3-i. In bending tests the additional tests may be made at a reduced rate of speed, not exceeding 15 bends per minute.

4. Tensile strength of wire.

4-a. Specimens shall not be less than 18 inches long, and the distance between

H. L. WHITTEMORE

Wire Lines and Manila Cordage.

the grips of the testing machine shall not be less than 12 inches. The speed of the movable head of the testing machine, under no load, shall not exceed 1 inch per minute. Any specimen breaking within one-quarter inch from the jaws shall be disregarded and a retest made.

(Note: It has been found that the diameter of wire can more easily and accurately be determined by placing the wire specimen in the test machine and applying a load not over 25 per cent of the breaking strength of the wire.)

4-b. The tensile strength of the various grades shall be within the values shown in Table 1.

(Note: A tension testing machine such as is shown in Tinius Olsen Catalog 10, Plate 479, Part E, or other testing machine of similar characteristics, power driven, is recommended for making these tests. The smaller counterpoise should be used for making tests up to its capacity, and beyond that the larger counterpoise.)

TABLE 1
Tensile Strength
Pounds per square inch.

A.P.I. Grade	Wire Minimum	Minimum aver'ge. Sum of all breaking stresses divided by sum of areas of all wires tested.	Wire Maximum
	Individual		Individual
J	210,000	220,000	260,000
L	190,000	200,000	250,000
N	170,000	180,000	230,000

5. Elongation.

5-a. The ultimate elongation shall be measured when making the tensile tests of wire. The ultimate elongation, measured on a 10-inch length of specimen, at instant of rupture, which must occur within the 10-inch length, shall not be less than the values given in Table 2 for Grades J, L and N. When determining elongation a stress shall be imposed upon the wire equal for Grades "L" and "N," to 75,000 pounds per square inch, at which point the extensometer is applied. Direct to the reading of the extensometer shall be added three-tenths of 1 per cent to allow for the initial elongation occuring before application of the extensometer. For grade "J" and stronger 100,000 pounds per square inch shall be applied; the additive elongation to be four-tenths of 1 per cent.

Figure 1—Extensometer.
Designed by C. C. Sunderland
Courtesy of John A. Roebling's Sons Co.

TABLE 2
Elongation

Size of wire—	Min. Elongation in per Cent
Wire .07" diameter and larger..	2 %
Wire less than .070" to .040" dia.	1¾ %
Wire less than .040" to .020" dia.	1½ %
Wire less than .020" dia.	1 %

6. Torsion tests of wire.

6-a. The distance between the jaws of the testing machine shall be 8 inches, plus or minum one-sixteenth inch when the wire is straight. One end of the wire is to be rotated with respect to the other end of the wire at a continuous, uniform speed until breakage occurs. During the test the applied tension shall not exceed 5 per cent of its breaking strength as measured in the tensile test. The speed of rotation shall be a minimum of 30 and a maximum of 60 per minute. If the temperature of the wire increases perceptibly the speed shall be decreased. A distance on the untwisted wire equal to 100 times the diameter is to be taken as the unit of test strength and the wire under test must withstand the number of twists given in Table 3 computed on this unit of length. One clamp of the torsion machine shall be movable in a direction parallel to the axis of the wire. The wire shall be twisted by rotating one or both clamps at a uniform rate not exceeding a sum of 60 twists per minute. Tests in which breakage occurs within one-eighth inch of jaw shall be discarded.

TABLE 3
Torsion Test
Minimum number of twists of 360 degrees for individual wires in a length equal to 100 times the wire diameter.

A.P.I. Grade—	Number of Twists for Individual Wires
J	27½
L	30
N	32½

6-b. If when making the specified test of wires any wires fail to meet the torsion test requirement, all the wires in the rope must then be tested and 95 per cent of all such wires must meet the requirement for torsion herein specified, none of the remaining 5 per cent to be less than 60 per cent of the torsion values herein given. (See paragraph 3-h.)

6-c. The torsion testing machine for rope wire testing shall have following characteristics:

6-d. One jaw fixed axially, and the other jaw movable axially and arranged to permit tension weights to be applied to wire under test.

6-e. The jaws to be capable of holding wire firmly without slippage. Machine must be equipped with automatic counter to record the number of twists. Control of speed so that it can be uniform can best be had with a power operated machine, and this is recommended as standard.

Note: A torsion testing machine such as shown in Tinius Olsen catalog, Plate No. 942, Catalog 10, Part E, power driven, or any other machine of similar characteristics is recommended as suitable for making this test.

6-f. Weights to be applied shall be as shown in Table 4.

TABLE 4
Tension Weights for Torsion Tests

Size Wire: Inches	Applied Weights: Pounds
.011 to .016	1
.017 to .020	2
.021 to .030	4
.031 to .040	6
.041 to .050	8
.051 to .060	9
.061 to .070	11
.071 to .080	13
.081 to .090	16
.091 to .100	19
.101 to .110	21

7. Bend test of wires.

7-a. The machine shall be so designed that the mandrels touch the wire and maintain it in a symmetrical position

H. W. LADD

Rigs and Derricks; Rig Irons; Wire Lines and Manila Cordage.

with respect to the axis for all sizes of wire under test. The center of rotation for bend test shall fall on the center line of the axis of the wire and directly in line with the point of tangency of the mandrel with the wire. Bends shown in Table 5 shall be at a speed of between 30 and 40 bends per minute. At a greater speed values will be reduced. (See paragraph 3-i.) Each bend will be understood to mean bending the wire at right angles and returning to the central position. The machine should be arranged so that it can be driven with power to secure uniformity of speed.

7-b. The distance between top of jaw or mandrel and lower edge of guide not to exceed 2 inches.

7-c. The wire must stand the bend test shown in Table 5 before fracture.

TABLE 5
Bend Test on Rope Wire

Size of Wire	Number of bends over radius equal to six times diameter of wire. Grade L and Grade N	Grade J
.031-.050	50	45
.051-.070	47	43
.071-.090	43	39
.091-.110	40	36

7-d. Mandrels for bend test shall be accurate to correspond to the values given in Table 6.

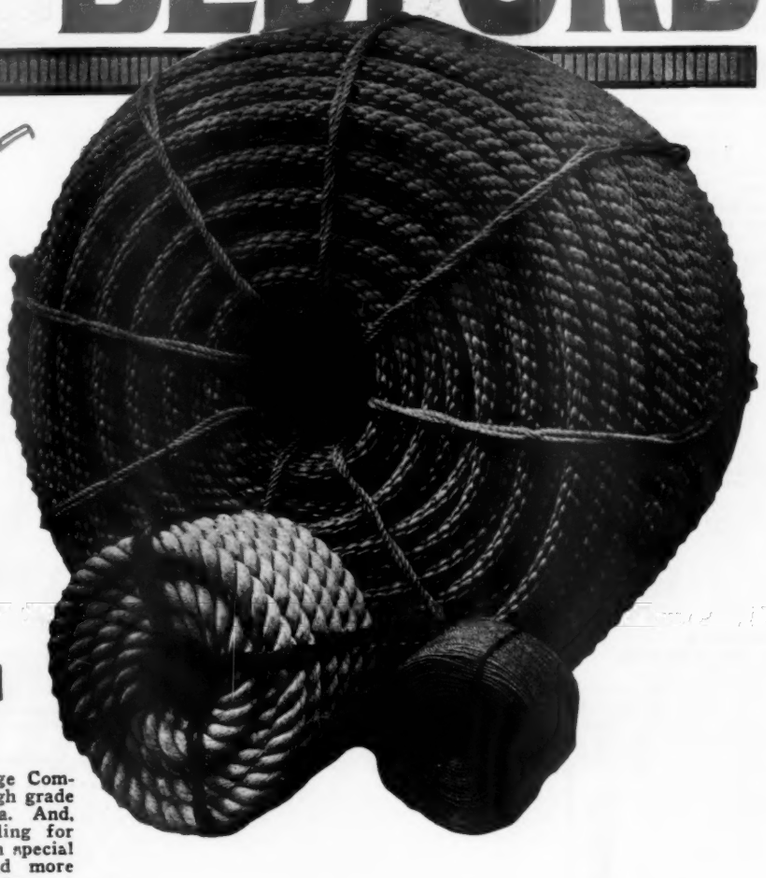
TABLE 6
Mandrel Sizes for Bend Test

Wire Size Inches	Mandrel Radius Inches
.031-.040	.210
.041-.050	.270
.051-.060	.330
.061-.070	.390
.071-.080	.450
.081-.090	.510
.091-.100	.570
.101-.110	.630

7-e. The bend test not to apply to wire .030 inch diameter and smaller.

NEW BEDFORD

DRILLING CABLES
BULL ROPES
TORPEDO LINES



PURE MANILA LONG FIBER

In 1844 the New Bedford Cordage Company began the manufacture of high grade cordage from selected pure manila. And, ever since men have been drilling for petroleum, this company has given special care to producing stronger and more durable cordage for the Oil Industry.

NEW BEDFORD long fiber, pure manila Drilling Cables, Plain Laid Ropes, Bull Ropes and Torpedo Lines are unsurpassed for true economy.

"If CONTINENTAL Sells It, There Is No Better"

THE CONTINENTAL SUPPLY COMPANY
General Offices: St. Louis
Export Office: 74 Trinity Court, New York
London Office: 316-317 Dashwood House, Old Broad St., E. C. 2.
THE CONTINENTAL SUPPLY COMPANY, LIMITED
69 Thomas Block, Calgary, Alberta, Canada

CONTINENTAL

8. Strength of ropes: Testing full-rope size specimens.

8-a. Minimum ultimate strength of ropes shall be as specified in Table 7 and 8. When testing finished ropes to their ultimate strength, suitable sockets shall be attached by the method described under the heading "Directions for attaching sockets to wire rope," as contained in Section V.

8-b. The length of test specimen shall not be less than 3 feet between sockets for ropes up to 1 inch diameter, inclusive, and for ropes 1⅛ inches diameter and larger the minimum length between testing sockets shall be 5 feet.

8-c. If the first specimen fails at a value below the specified ultimate strength, a second test shall be made, and if the second test meets the strength requirements the wire rope shall be accepted.

8-d. The machine used for the finished rope test shall not have a capacity of more than 20 times the strength of the rope being tested. When testing, it is recommended that oversize wire rope sockets be used; i.e., a socket for a rope one-quarter inch larger in diametre than the rope under test. The counterpoise used on such a machine shall not be in excess of five times the strength of the rope being tested.

TABLE 7

Minimum Ultimate Strength of 6x19 Ropes

Nomin'l Diam.of Rope	Approx-mate Wt. Lbs.per ft.	Grade N Pounds	Grade L Pounds	Grade J Pounds
3/8"	.22	8400	9200	10100
7/16"	.30	11600	12600	13800
1/2"	.39	15000	16400	17900
9/16"	.50	19000	20600	22500
5/8"	.62	23000	25600	27900
3/4"	.89	31600	36400	40000
7/8"	1.20	41400	48000	53000
1 "	1.58	54000	62000	69000
1-1/8"	2.00	67000	77000	86000
1-1/4"	2.45	82500	95000	106000
1-3/8"	3.00	98000	113000	128000
1-1/2"	3.55	115000	133000	150000

TABLE 8

Minimum Ultimate Strength of 6x7 Ropes

Nomin'l Diam.of Rope	Approx-mate Wt. Lbs.per ft.	Grade N Pounds	Grade L Pounds	Grade J Pounds
3/8"	.22	8300	9500	10600
7/16"	.30	9900	11300	12600
1/2"	.39	13900	16000	18000
9/16"	.50	18000	19800	21600
5/8"	.62	23400	25400	28800
3/4"	.89	33500	37800	41400
7/8"	1.20	43200	50400	55800
1 "	1.58	55800	63000	68400

SECTION 4
Manufacture and Tolerances

9. Strand construction.

9-a. Strands for 6x19 construction ropes shall have not less than 16 wires and not more than 25 wires per strand. Individual strands shall be fabricated in one operation of stranding, as stipulated in United States Government Master Specification for Wire Rope No. 297.

9-b. Strands for 6 by 7 and 6 by 8 construction ropes shall contain the number of wires as specified by the trade name; namely, seven wires per strand for the 6x7 construction, and eight wires per strand for the 6 by 8 construction.

A. C. McLAUGHLIN
Wire Lines and Manila Cordage.

10. Joints in wire.

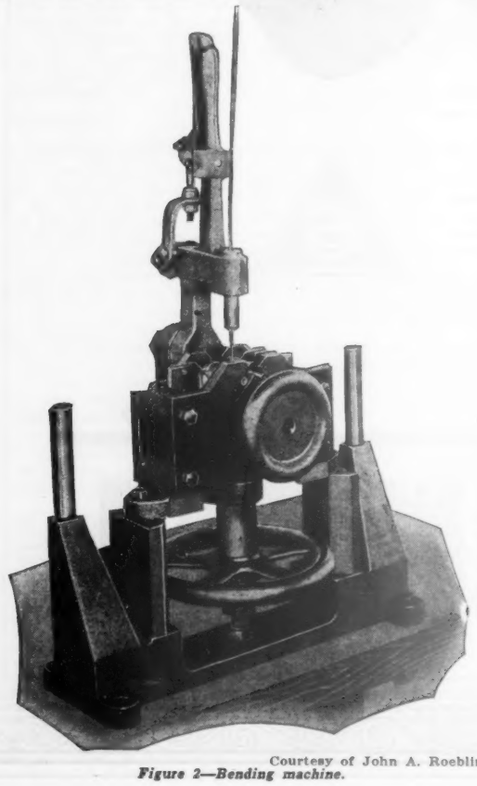
10-a. In the manufacture of wire ropes, wire shall be made continuous by brazing or electric welding, and no two joints in any one strand shall be closer than 25 feet to each other. Joints shall be made so they will withstand a strength of at least 50 per cent of the original strength of the wire.

11. Direction of lay.

11-a. Standard right lay rope will be furnished unless specified to the contrary by the purchaser.

12. Length of lay.

12-a. For 6 by 7 and 6 by 8 drilling lines, also for 6 by 7 ropes used for sand lines, the lay of the finished rope shall not exceed eight times the diameter of the rope.



Courtesy of John A. Roebling's Sons Co.
Figure 2—Bending machine.

12-b. For six-strand ropes made of strands containing 16 to 25 wires, the lay shall not be more than 7¼ times the nominal diameter.

13. Diameter of ropes—tolerance limits.

13-a. The diameter of a wire rope shall be measured at least 5 feet from end with a suitable measuring device, with at least 3 inches length of jaw. Figure 3 illustrates the correct and incorrect method of measuring the diameter of wire rope when using a machinist's caliper.

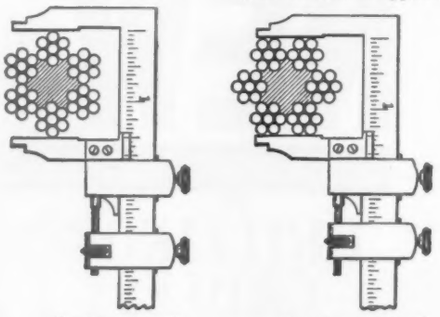

Correct way to measure the diamater of wire rope
Use a machinist's caliper square.
Incorrect way to measure the diamater of wire rope

Figure 3—Measurement of diameter.

13-b. Figure 4 illustrates an approved type of caliper for measuring the diameter of wire rope.

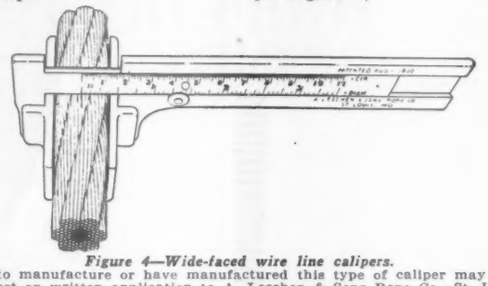


Figure 4—Wide-faced wire line calipers.
Permission to manufacture or have manufactured this type of caliper may be secured without cost on written application to A. Leschen & Sons Rope Co., St. Louis, Mo.

13-c. The diameter of a wire rope is the diameter of the circumscribed circle. The amount which the actual diameter of a rope differs from the nominal diameter shall not be greater than the values in Table 9.

TABLE 9

TOLERANCE ON ROPE DIAMETERS

Nominal Diameter of Rope in Inches	Undersize Inches	Oversize Inches
0 to ¾	0	3/64
13/16 to 1⅛	0	1/16
1 3/16 to 1½	0	5/64

14. Diameter of wire—tolerance limits.

14-a. In separating the wire rope for gauging of wire, care must be taken to separate the various sizes of wire composing the different layers of wires in strand. In like positioned wires total variations of wire diameters shall not exceed:

Wire Size—	Total Variation Inches
.064 and larger	.004
Smaller than .064	.003

15. Fibre cores.

15-a. For all wire ropes manufactured under this specification, all fibre cores will be of hard twisted, best quality manila or java hemp, or its equivalent. They shall be of uniform diameter and hardness, and effectively support the strands. They shall be thoroughly impregnated with a suitable lubricating compound, free from acid. No jute cores shall be used.

16. Lubrication.

15-a. All wire ropes, unless otherwise specified, shall be lubricated and impregnated in the manufacturing process with suitable compound to thoroughly protect the ropes both internally and externally, to minimize rust or corrosion until the rope is put into service.

17. Workmanship.

17-a. The rope shall be made from the best quality of specified grade of material, shall be of good workmanship, and shall be free from defects which might affect its appearance or serviceability.

SECTION 5
Directions for Attaching Sockets to Wire Ropes

18-a. The rope shall be securely seized and served with soft wire ties before cutting and at least two additional seizings placed at a distance from the end equal to the length of the basket of the socket. For large ropes the seizing shall be several inches long and securely wrapped with a seizing iron. This is very important, as it prevents the rope untwisting and insures equal tension in the strands when the load is applied. (See Figure 5 of United States Government Master Specifications for Wire Rope No. 297, as per Figure 5.)

18-b. The rope being properly seized shall be inserted through the socket or mandrel then end seizing taken off. Care must be taken that the lay of the line is not allowed to untwist. The hemp center shall be cut back to the seizing and the wire shall be untwisted and broomed out, although they need not necessarily be straightened.

18-c. The wires, for the distance that they are to be inserted in the socket, shall be carefully cleaned with benzine, naphtha, or gasoline, and then the wires dipped for a distance not greater than three-quarters of the cleaned length of the wire in commercial muriatic acid for from 30 seconds to 1 minute, or until the acid has thoroughly cleaned each wire. Care should be taken that the acid does not come in contact with any other portion of the rope. If it does, the wires will become brittle.

18-d. The wires should be dipped in boiling water containing a small amount of soda to neutralize the acid.

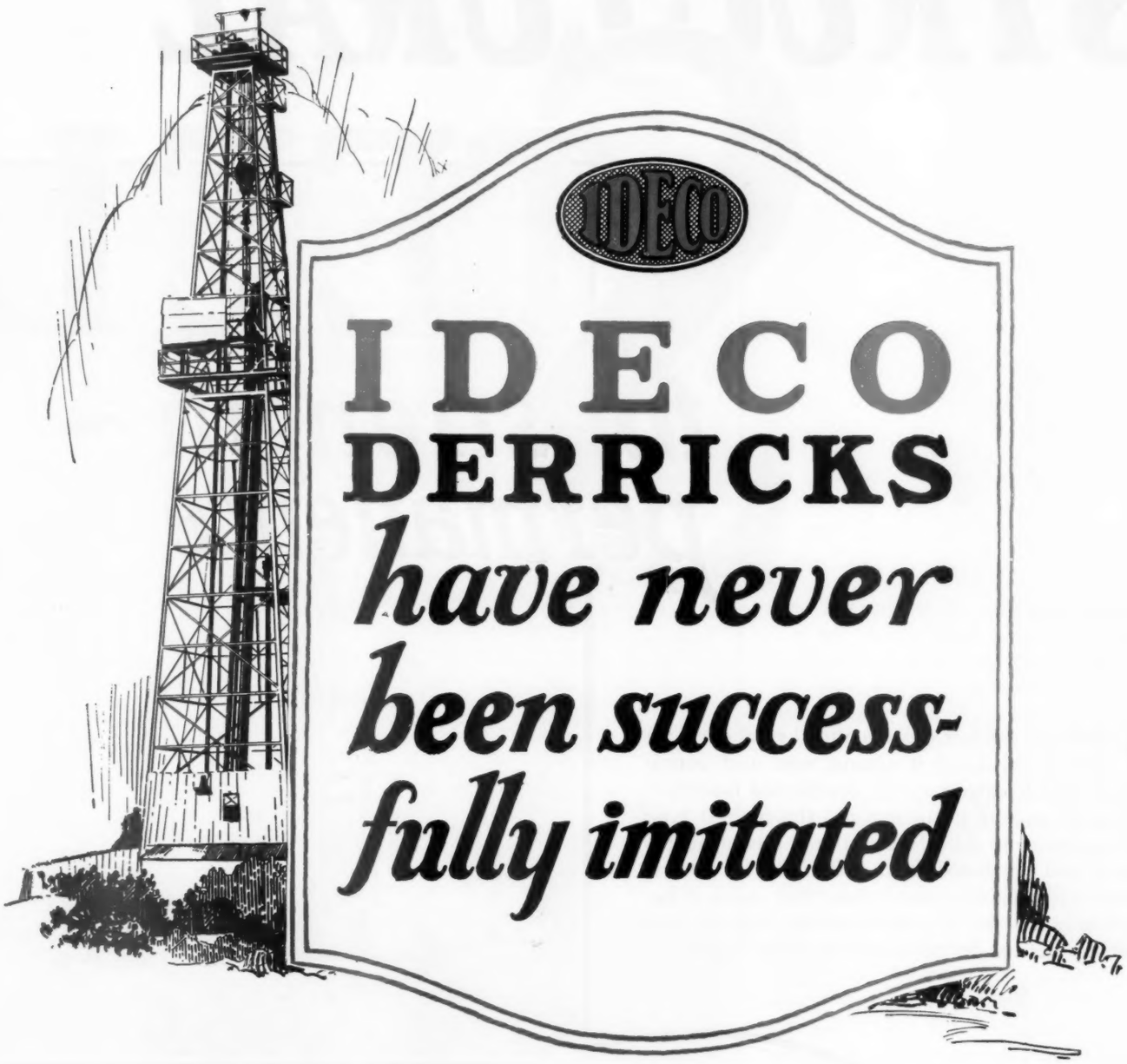
18-e. The wires should be inserted into the basket of the socket. Care should be taken that the socket is in line with the axis of the rope.

18-f. The base of the socket should be sealed with putty, clay or any similar substance. Pour molten zinc into the basket until it is full.

18-g. The zinc must not be too hot or it will anneal the wires, particularly for small ropes. The temperature shall not be above 830 degrees Fahrenheit. When the zinc has solidified sufficiently, the socket may be plunged into cold water. If socketing is properly done, the strands will break near the middle of the specimen, not at the end of the basket. Pine stick test to be made. If it chars but does not ignite, then zinc is ready to pour. If zinc is overheated it has a red color and stick will catch fire.

18-h. Do not use babbitt metal, or lead for socketing wire rope. If they are used, the strength of the fastening will

(Continued on Page 316)



IDECO

IDECO DERRICKS *have never been successfully imitated*

INTERNATIONAL STEEL IDECO DERRICKS (GALVANIZED)

THE INTERNATIONAL DERRICK & EQUIPMENT CO.

Dallas, Houston, Mexia, Wichita Falls, Pyote, Amarillo, Borger, Corsicana, Pampa, Panhandle, Shreveport, Oil City, Smackover

The largest company devoted exclusively to the manufacture of steel (galvanized) equipment for the oil, gas and artesian industries

COLUMBUS, OHIO TORRANCE, CAL.

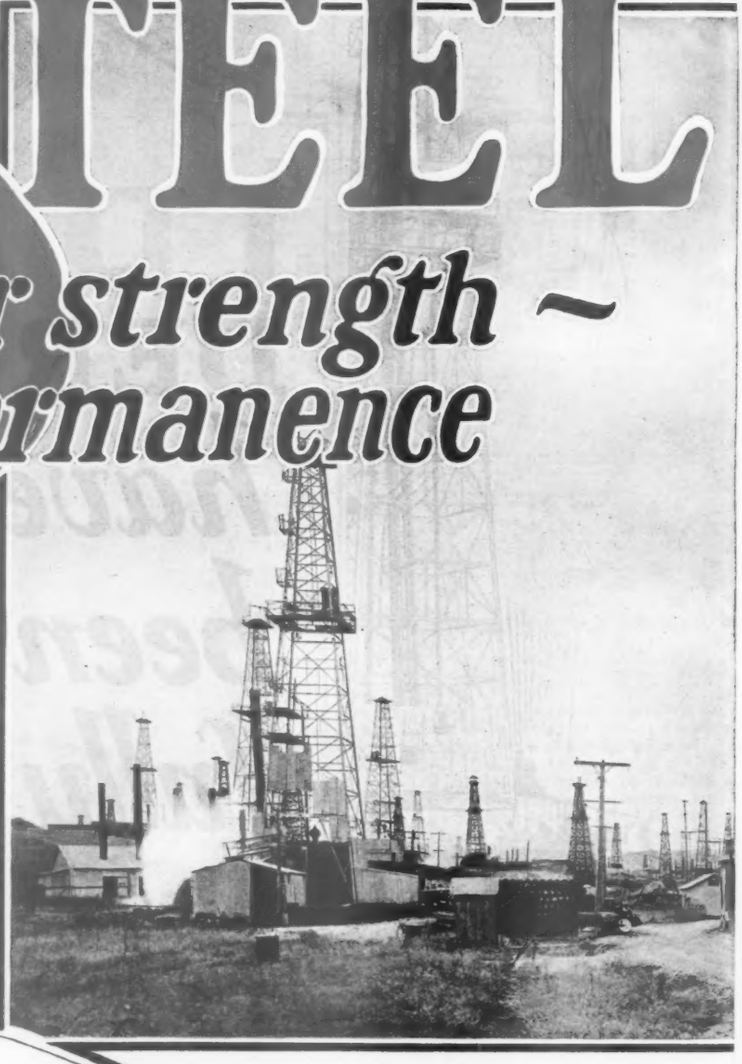
California Representative
National Supply Co. of California

Eldorado, Tulsa, Tonkawa, Drumright, Okemah, Seminole, Wewoka, Denver, Casper, Torrance, Los Angeles, Taft

Export Representation: 74 Trinity Place, New York City Columbus, Ohio Los Angeles and San Francisco, Cal.

STRUCTURAL STEEL

for strength ~ permanence



FIRST to perfect the structural steel derrick; first to galvanize it against rust and corrosion; first to introduce the reenforced feature—through careful designing and the highest type of engineering skill, International has incorporated and produced in the IDECO Structural Steel Derrick inherent values that make it unquestionably the strongest yet the lightest and most practical derrick on the market today.

Other

"IDECO" Oil Field Products

Steel Rigs
Bull Wheels
Band Wheels
Calf Wheels
Bull Hoists
Tug Rims
Walking Beams
Rig Irons
Pitmans
Sheaves
Crown Blocks
Chain Driven Sand Reels
Crank Counter-balances
Tool Boxes
Forge Boxes
Lightning Defence Towers
Tank Steps and Walk Ways
Machinery Supports
Steel Buildings

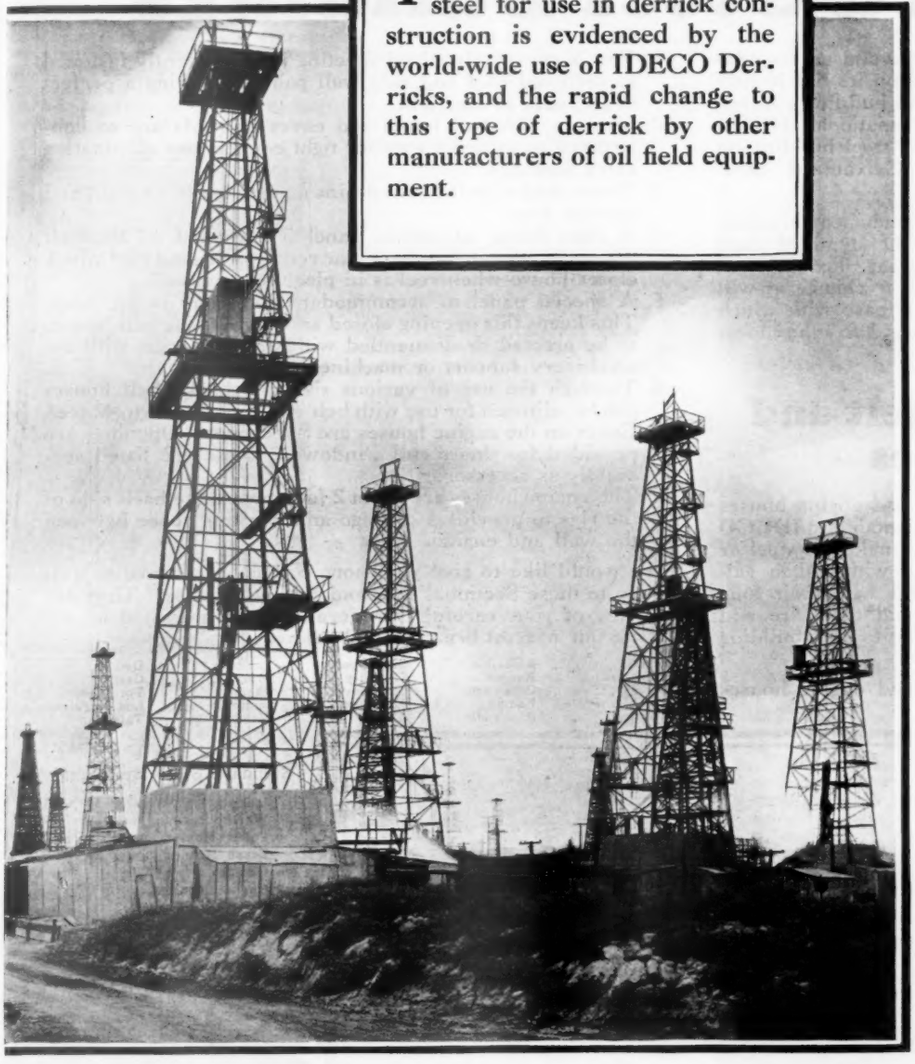
Branches in every important oilfield.

Export Offices:
74 Trinity Place, New York

Columbus Houston
Los Angeles

The International Der
COLUMBUS, OHIO

THE superiority of structural steel for use in derrick construction is evidenced by the world-wide use of IDECO Derricks, and the rapid change to this type of derrick by other manufacturers of oil field equipment.



THE material and workmanship is of the highest quality. Every brace, every girt, every bolt and rivet is conceived to perform a duty, yet no place is the shearing value of a bolt or rivet a determining factor in the structure. Every joint is a positive connection. There are no friction joints or special bolts or fastenings.

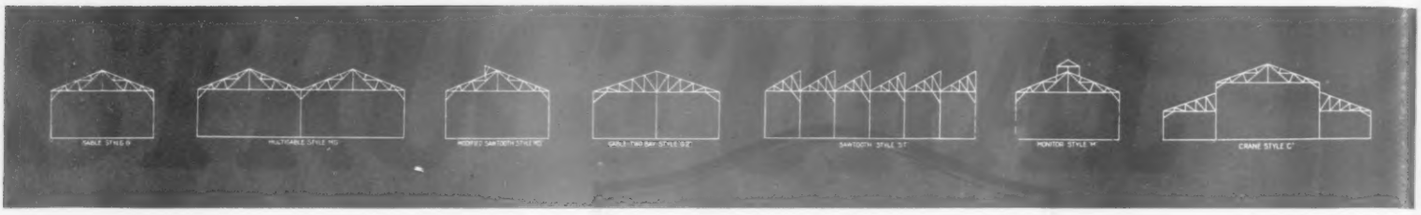
Strong, safe, light in weight; easy to erect and dismantle; there is nothing left to be desired in an IDECO Steel Derrick. Heavily galvanized, rust and the weather cannot eat away its strength. Its light weight and minimum of parts makes it easy to move.

INTERNATIONAL STEEL IDECO DERRICKS

(GALVANIZED)

rick & Equipment Co.

TORRANCE, CAL.



Standard Steel Buildings

The strength of a building lies in its frame and unless adequately protected against rust and corrosion its life is limited. Examine the frame of the next steel building you see and then compare it to a frame of an International IDECO Standard Steel Building which is the only steel building on the market regularly furnished with Galvanized Steel Frames.

Rust-proof, fire resisting, strong, of permanent construction (yet portable) the advantages of IDECO standard steel buildings are easily recognized. The great flexibility of IDECO design makes it possible to add or change at will the size of the building at any time. The ease with which it can be erected and dismantled and moved to other locations is also of important consideration.

IDECO Sectional Belt and Engine Houses

The "IDECO" type "O2" sectional belt and engine houses are light portable structures universally adaptable to IDECO Derricks and Machinery Supports and all makes of steel or wooden rigs. Adequately flashed, made with either galvanized or painted frames, these buildings with their long life, ready portability, ease of erection and their fire and rust resisting qualities offer the solution to the building problem that every operator faces.

Special features of these sectional belt and engine houses are—

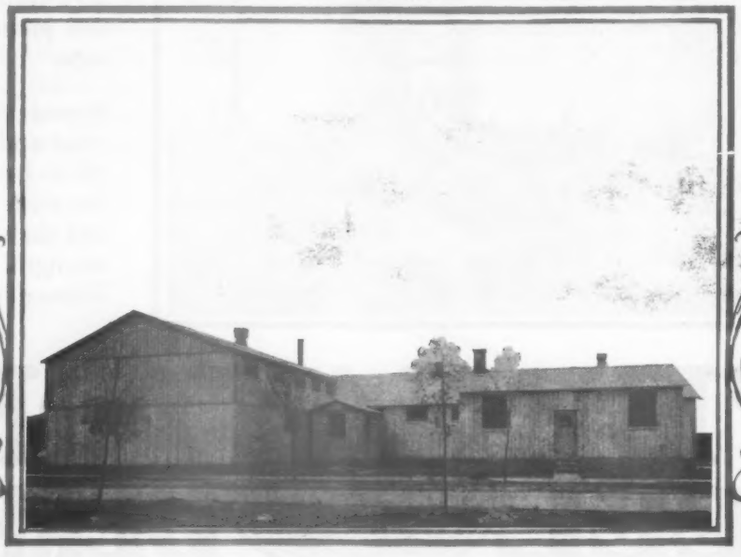
1. The 26 gauge galvanized sheeting is permanently fastened to sectional roof and side wall panels, insuring a perfect fit and ease of erection.
2. Corners, sidewall joints and eaves of roofs are so constructed as to make weather tight connections eliminating extra flashings.
3. Water shed of belt house drains away from front walk and derrick floor.
4. A tight fitting adjustable panel is provided on the belt houses to permit installation or removal of sand reel which closes house when reel is in place or removed.
5. A special panel to accommodate the crank is provided. This keeps this opening closed and permits the belt houses to be erected or dismantled without interfering with the machinery support or machinery.
6. Through the use of various size panels the belt houses can be adjusted for use with belt centers from 34 to 42 feet.
7. Eaves on the engine houses are 8 feet high. Openings are provided for doors and windows. These are listed separately as accessories.
8. The engine houses are offset 2 feet toward the back side of the rigs to provide a passage and working space between the wall and engine.

We would like to give you more complete information relative to these Sectional Belt and Engine Houses. They are worthy of your careful consideration. If interested kindly write our nearest branch listed below.

Dallas	Amarillo	Shreveport	Tonkawa	Denver
Houston	Borger	Oil City	Drumright	Casper
Mexia	Corsicana	Smackover	Okemah	Torrance
Wichita Falls	Pampa	Eldorado	Seminole	Los Angeles
Pyote	Panhandle	Tulsa	Wewoka	Taft

Standard Steel Buildings include:

- Warehouses
- Power Houses
- Lease Houses
- Garages
- Engine Houses
- Belt Houses
- Pump Houses
- Gas Compressor Stations



Standard Steel Buildings include:

- Warehouses
- Power Houses
- Lease Houses
- Garages
- Engine Houses
- Belt Houses
- Pump Houses
- Gas Compressor Stations

The International Derrick & Equipment Co.

Columbus, Ohio **Torrance, Cal.**

Export Representatives
74 Trinity Place, New York City

COLUMBUS, OHIO HOUSTON, TEXAS LOS ANGELES and SAN FRANCISCO, CAL.

California Representative—National Supply Co. of California

The largest company devoted exclusively to the manufacture of steel (galvanized) equipment for the oil, gas and artesian industries.

Rig and Derrick Standardization

Two Hundred Different Sizes and Innumerable Noninterchangeable Parts Offered Big Problem

By W. W. Fondren
Vice President, Humble Oil & Refining Co.

A special committee on the standardization of standard rigs and and derricks was organized by the American Petroleum Institute in 1924. This committee which is composed of representatives from all petroleum producing districts in the United States and representatives of all derrick and standard rig manufacturers started its work by canvassing the entire industry for information, data and dimensions on standard rigs and derricks

W. W. FONDREN
National Chairman, Rigs and Derricks.

that were then in common use throughout the industry. It was found that there were nearly 200 different sizes of derricks in use, and innumerable standard rig parts that frequently varied only slightly in their dimensions but sufficiently so that they were not satisfactorily uniform or interchangeable.

Derricks

It was found that a few large derrick manufacturers had given a great deal of study to the industry's requirements for derricks and had provided a line of derricks suitable to their needs as they found them, while other manufacturers simply manufactured one or two derricks for the

HARRY M. RUNKLE
Rigs and Derricks.

trade and others manufactured or erected derricks according to orders received. After a process of consolidation and elimination the committee found that the actual requirements of the industry could be met with a very limited number of different sizes of derricks. Consequently, tentative schedules governing over-all dimensions were set up as recommended standard at the June 1925 meeting of the committee. Since that meeting the committee has met regularly every six months with some subcommittee meetings in between for the purpose of considering the application of the standards set up to the requirements of the industry in every district. Representatives of producing companies from all districts have devoted a great deal of time to this work. Manufacturers also have given their unqualified support and co-operation to this work. many of them having had to lay aside the standards they had already developed at great cost and redesign their derricks to suit A.P.I. specifications.

Over-all Dimensions

A.P.I. derricks can be obtained in practically any required height. These der-

J. A. JONES
Rigs and Derricks.

ricks are provided with an ample and uniform water table opening which permits the interchangeability of crown blocks which is a very important feature from the producers' standpoint. Two systems of developing base dimensions have been carried out. One system provides for the interchangeability of derricks on the same or common foundation. In other words, all derricks of a similar construction, such as steel or such as combination wood and steel with wooden legs, having a 24 foot base will fit on the same foundation and over the same foundation bolts. A 122-foot drilling derrick with a 24-foot base can be replaced with a 94 or 87-foot production derrick with a 24-foot base without making any changes whatsoever in the foundation. Or, with this system of bases a 20-foot base derrick can be erected independently within a 24-foot base without disturbing the larger derrick untll the smaller derrick is completed. Another system of bases provided is commonly known as the standard taper system, or series of bases, which provides in reality but one derrick which is shortened from the base up to provide any length of derrick required. This series of derricks, or in fact the one derrick, provides opportunity for lowering the upper part of a tall derrick down inside of the original derrick base on to a smaller base provided, thus providing a shorter production derrick. This shorter production derrick can, of course, be salvaged and re-erected as the upper part of a tall drilling derrick. Such a system of derrick construction naturally results in a minimum of warehouse stocks both on the part of the manufacturer and the derrick user, as well as providing a uniform or common derrick for all purposes. Reinforcing legs are used for heavy duty work.

Minor Dimensions

Derrick dimensions, other than the

IRA L. NEELY
Rigs and Derricks.

major or over-all dimensions, have also been made standard in so far as it has been found practical. The location of the drill hole, for instance, has been fixed for all Americian Petroleum Institute derricks. This facilitates uniformity of design in floor foundations as well as the location of drilling and production equipment. Another such dimension that has been fixed which will greatly facilitate well operations is the clearance required for the window opening of a derrick.

Foundations

Frequently derrick foundations do not

A. W. PEAKE
Rigs and Derricks.

receive sufficient attention either as to spread, or weight, or depth, and this results in trouble for the operator sooner or later. A derrick foundation of insufficient weight to prevent derrick over-turn in a wind naturally results in costly derrick destruction. A derrick foundation of insufficient spread, or bearing area, frequently results in uneven settlement at the derrick corners, causing derrick failures when this condition is not remedied before the derrick is re-loaded. Substantial derrick foundations are one of the first requirements to satisfactory well operations and they should receive careful consideration on the part of the operator, not only when they are designed and constructed, but also after they are in use.

Capacities

A feature of the American Petroleum Institute derrick specifications which will unquestionably render a great service to the industry, and one which has heretofore had but very little consideration,

F. D. BEARLY
Rigs and Derricks.

fixes the working capacity of a derrick. All American Petroleum Institute derricks will carry a data plate located on the starting leg or first girt which will give pertinent information concerning the derrick to which it is attached. Besides giving the working capacity of the derrick, both with and without a specified reinforcing, it will show the wind load that the derrick will withstand when properly anchored to a sufficient foundation. This, and other information on this data plate will be of much value to purchasing departments, warehouse departments, superintendents, drillers and all other workmen who are concerned with the use of the derrick. American Petroleum Institute derricks can, therefore, be purchased at their true value, which value lies principally in the capacity of the derrick. A driller need not longer wonder whether or not his derrick will stand the work he has for it to do, as the capacity of the derrick can be known to him from the data plate.

Standard Rigs

All standard rig parts have received the attention and study of the committee, and so far as it has been found practical, the governing dimensions have been made standard. Such a procedure naturally results in interchangeability and thereby an elimination of considerable cost in rig erection and repairs.

The economies and savings to be had in

the use of American Petroleum Institute standard rigs and derricks must, it seems to the writer, be quite evident. The representative operators and manufacturers who have devoted so much time to the study of this subject and who compose this committee can unhesitatingly recommend that American Petroleum Institute standards rigs and derricks be specified and adopted as soon as possible by all operators.

A.P.I. SPECIFICATIONS FOR STANDARD RIGS AND DERRICKS

SECTION 1
Material Covered

1-a. These specifications cover the major dimensions of steel and combination wood-and-steel (turn-buckle) derricks, including heights, bases and water-table openings; also of standard rig parts, including sampson posts, walking beams, bull wheels, calf wheels and band wheels. They cover also the dead and wind load capacities of derricks and the working capacities of sampson posts and walking beams, together with the methods of computing these capacities.

1-b. The standards contained herein are primarily dimensional, but they include also the minimum physical properties of material in so far as the strength computations require the use of unit stress figures, and apply to new material.

SECTION 2
Workmanship and Finish

2-a. Machined Surfaces: All machined surfaces shall be finished in a good and workmanlike manner and shall be free from burrs, rough edges, etc.

2-b. Castings: All castings shall be thoroughly cleaned and all cored holes shall be drifted to insure free passage of proper-size bolts.

2-c. Protective Covering: All forged or rolled steel parts or sections, and all cast material shall be covered before shipment with a good grade of commercial paint (or shall be galvanized), except such surfaces as are machined for bearing service, which latter shall be protected with a suitable lubricant or compound.

SECTION 3
Steel Derrick Dimensions
Definitions of measurements

3-a. Derrick Heights: The height dimension "A" shall be measured along the neutral axis of the derrick leg from the top of the derrick floor joists to the bottom of the water-table beams or bumpers, with a tolerance of plus 6 inches minus zero.

3-b. Derrick Bases: Shall be square, and base square dimensions "B" and "C" shall be the measurement between the neutral axis of adjacent legs measured at the top of the derrick floor joists, with a tolerance of 2 inches plus or minus. Base "B" is a fixed dimension which permits interchangeability of several height derricks of this group on common sized bases. Base "C" is an alternative fixed dimension which permits all derriks of this group to have a common taper, and is established by the size No. 2 derrick 122 feet no inches high with 26 feet no inches base and 5 feet 6 inches water-table opening.

3-c. Water-Table Opening: Shall be square, and water-table opening dimension "D" shall be the inside or in-the-clear measurement of the opening in the water-table, with a tolerance of 2 inches plus or minus.

Steel Derrick Sizes

3-d. Derrick Heights, Bases and Water-table Openings: The standard sizes of A.P.I. steel derricks shall be as specified in Table 1. The 11 sizes may be referred to by numbers, and each size shall have only the particular combination of height "A," base square "B" or "C" and water-table opening "D" as given. Odd numbers refer to derricks with class "B" bases and even numbers to derricks with class "C" bases.

Steel Derrick Parts Dimensions

3-e. Gin Pole: The gin pole shall be constructed so as to extend across the center of the water-tube opening. The clearance between the gin pole and the base of the crown block shall be 8 feet no inches minimum.. See Dimension "E," Figure 1.

3-f. Window Opening of Steel Derricks for Rotary Drilling: On steel derricks for rotary drilling the minimum window opening height shall be 24 feet no inches in the clear measured parallel to the center line of the derrick side from the top of the derrick floor joists, less the thickness of the roller, and a calf wheel girt with braces (for attachment to sampson post) shall be provided for cable tool work. The girt shall extend either from derrick leg to derrick, or from calf wheel derrick leg to a suitable post located adjacent to sampson post. See Dimension "F," Figure 1.

3-g. Bull Wheel Girt Clearance: The distance in the clear from the bull wheel girt to the top of the derrick floor joists shall be 9 feet 6 inches, measured parallel to the center line of the derrick side. See "G," Figure 1.

3-h. Calf Wheel Girt Clearance: The distance in the clear from the calf wheel girt to the top of the derrick floor joists shall be 11 feet measured paralel to the center line of the derrick side, with a tolerance of plus or minus one-eighth inch. See "G," Figure 1.

3-i. Corner Foundation Bolt Settings: At each A.P.I. steel derrick corner foundation there shall be set two 1-inch by 36-inch foundation bolts, with upper ends threaded 6 inches with standard threads. These bolts shall be set on the sides of a square 12 inches larger than the nominal base square, and located 10 inches plus-minus one-eighth inch from the corners of said larger square. Said bolts shall be set to protrude 6 inches above foundations. The foundation bolt holes in the derrick shall be 1⅜-inch diameter.

3-j. Center of Drill Hole: The center of the drill hole shall be 6 inches from the center of the derrick base on the center line towards the sampson post, with a tolerance of plus or minus one-half inch. See "Q," Figure 1.

TABLE 1—A.P.I. STEEL DERRICK STANDARD SIZES
See Figure 1

Size No.	Heights: Nominal "A"	Heights: Tolerance	Base Squares: Nominal "B"	Base Squares: Nominal "C"	Base Squares: Tolerance	Water Table Opening: Nominal "D"	Water Table Opening: Tolerance
1.	122 ft. 0 in.	+6 in.—0 in.	24 ft. 0 in.		±2 in.	5 ft. 6 in.	±2 in.
2.	122 ft. 0 in.	+6 in.—0 in.		26 ft. 0 in.	±2 in.	5 ft. 6 in.	±2 in.
3.	94 ft. 0 in.	+6 in.—0 in.	24 ft. 0 in.		±2 in.	5 ft. 6 in.	±2 in.
4.	94 ft. 0 in.	+6 in.—0 in.		21 ft. 5 in.	±2 in.	5 ft. 6 in.	±2 in.
5.	87 ft. 0 in.	+6 in.—0 in.	24 ft. 0 in.		±2 in.	5 ft. 6 in.	±2 in.
6.	87 ft. 0 in.	+6 in.—0 in.		20 ft. 3¼ in.	±2 in.	5 ft. 6 in.	±2 in.
7.	80 ft. 0 in.	+6 in.—0 in.	20 ft. 0 in.		±2 in.	5 ft. 6 in.	±2 in.
8.	80 ft. 0 in.	+6 in.—0 in.		19 ft. 1⅜ in.	±2 in.	5 ft. 6 in.	±2 in.
9.	73 ft. 0 in.	+6 in.—0 in.	20 ft. 0 in.		±2 in.	4 ft. 4 in.	±2 in.
10.	73 ft. 0 in.	+6 in.—0 in.		16 ft. 9⅞ in.	±2 in.	4 ft. 4 in.	±2 in.
11.	66 ft. 0 in.	+6 in.—0 in.	20 ft. 0 in.		±2 in.	4 ft. 4 in.	±2 in.

TABLE 2
PIPE SET BACKS FOR A.P.I. WIND LOADING

Derrick Heights	Exposed Areas Assumed Dimensions	Horizontal Component of Pipe Weight, Pounds
122'0"	3'8" wide 90'0" high	7050
94'0"	3'8" wide 67'6" high	5275
87'0"	3'8" wide 67'6" high	5275
80'0"	3'8" wide 67'6" high	5275
73'0"	2'7" wide 65'0" high	2230
66'0"	1'8" wide 44'0" high	812

SECTION 4
Steel Derrick Strength or Capacity Requirements

4-a. Structural Material:* Structural steel used in the construction of A.P.I. steel derricks shall be new and shall conform to the requirements of the American Society for Testing Materials, "Standard Specifications for Structural Steel for Buildings," serial designation A-9-24, as amended to date. Tubular steel used in construction of A.P.I. steel derricks shall be new and shall conform to A.P.I. pipe specifications as amended to date. (See A.P.I. Standards No. 5-A.)

4-b. Unreinforced Dead Load Capacity: The A.P.I. dead load capacity of an A.P.I. derrick without leg reinforcing, expressed in pounds, shall be the gross capacity of the derrick, and shall be specified on the name plate. It shall be equal to the sum of the strengths of the four unreinforced legs at their weakest section.

4-c. Reinforced Dead Load Capacity: The A.P.I. dead load capacity of an A.P.I. derrick, with leg reinforcing, expressed in pounds, shall be the gross capacity of the derrick when reinforced with properly applied reinforcing legs of a particular size. It shall be equal to the sum of the strengths of the four reinforced legs at their weakest section, the strength of each reinforced legs to be the sum of the strengths of the two or more leg elements. Both the dead load capacity when reinforcing legs are used and the size, weight per foot, and type of section of the leg reinforcing shall be specified on the name plate.

Dead Load Capacity Determinations:

4-d-1. The leg members of reinforcing leg members of an A.P.I. derrick shall be classified as "Main Compression Members," and their l/r ratio shall not exceed 120. The A.P.I. dead load capacities of A.P.I. derricks shall be determined by computing the sum of the strengths of the four leg members at their weakest section, considering same as columns unsupported between adjacent panel points, and determined in accordance with the American Petroleum Institute of Steel Construction (A.I.S.C.) column formula*, to-wit:

For ratios of l/r up to and including 60,

$$\frac{P}{a} = 15{,}000$$

and for ratios of l/r greater than 60,

$$\frac{P}{a} = \frac{18{,}000}{1 + \frac{l^2}{(18{,}000)\,(r^2)}}$$

where

P is the total compression load in pounds.

a is the gross cross sectional area of the column or leg element in square inches.

l is the unsupported length of the column or leg element between adjacent panel points in inches.

r is the corresponding least radius of gyration of the column cross section in inches.

4-d-2. This formula shall apply to derricks fabricated of structural steel or steel pipe having a minimum yield point of 27.500 pounds per square inch; steel having a yield point of less than 27,500 pounds per square inch shall not be used in the construction of A.P.I. derricks.

4-e. Wind Load Capacity: The A.P.I. wind load capacity of an A.P.I. derrick, expressed in miles per hour, shall be the maximum wind velocity that the unboarded derrick can withstand without failure, assuming the four legs to be anchored solidly and the derrick to be unguyed, and shall be specified on the name plate. Every A.P.I. steel derrick shall have a minimum A.P.I. wind load capacity of 70 miles per hour.

Wind Load Capacity Determinations:

4-f-1. The unit wind load, expressed in pounds, shall be determined by the formula, to-wit:

$$P = .004\ V^2$$

where V is the wind velocity in miles per hour.

P is the pressure in pounds per square foot of exposed area.

4-f-2. The unit wind load shall be considered to be applied to the exposed area of two parallel sides of the unboarded derrick and also to a set back of pipe assumed standing within the derrick. Exposed areas of pipe set backs shall have the assumed dimensions given in Table 2, Column 2, and shall be assumed vertical with one end on the derrick floor. The horizontal pressure or horizontal component of the weight of this set back of pipe shall be assumed as given in Table 2, Column 3, acting horizontally in the same direction as that of the wind at a height above the derrick floor equal to one-half the height of the set back of pipe. The algebraic sum of these two horizontal forces shall be applied at the finger board twenty-four (24) inches from the adjacent derrick side.

4-g. Leg Joint Requirements: The ends of the abutting leg sections shall be properly faced to give uniform bearing throughout the derrick. For the unreinforced derricks the connecting joints shall be designed to hold the abutting leg sections accurately in alignment under a combined dead load and wind load equal to at least the A.P.I. capacities. For the reinforced derrick the connecting joints shall be designed to hold the abutting leg sections accurately in alignment under a combined reinforced dead load and wind load equal to at least the A.P.I. capacities. This design shall incorporate factors of safety as specified in paragraph 4-h.

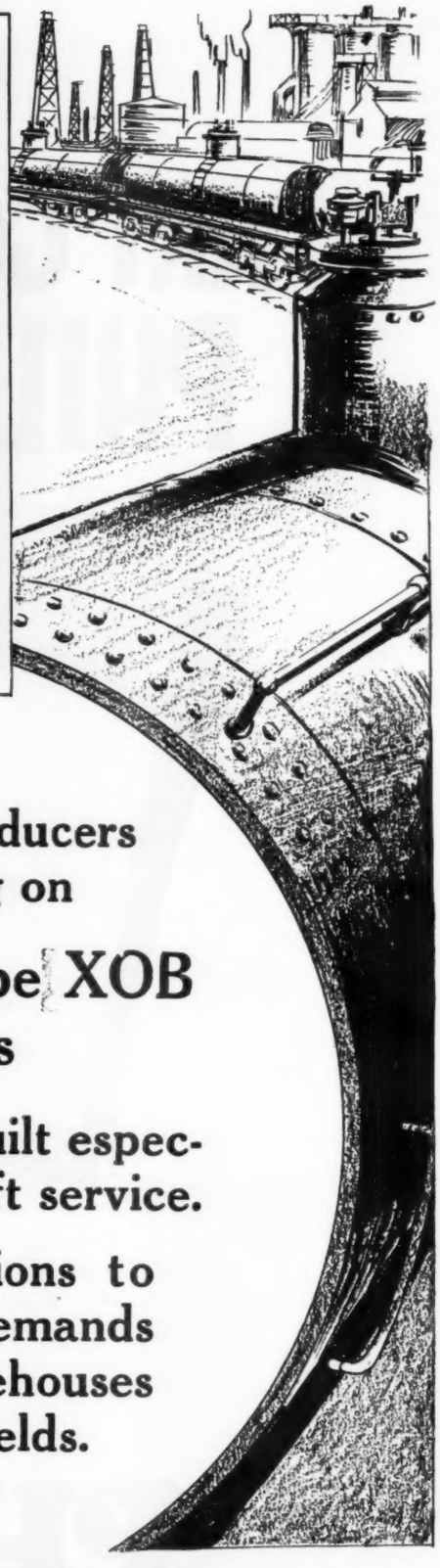
4-h. Joint, Girt, and Brace Capacities: All determinations of strengths of joints, girts, and braces of an unreinforced derrick shall be made in accordance with paragraph 5, "Allowable Stresses," shown in code of "Standard Specifications for Structural Steel for Buildings," June 1, 1923, of the *American Institute of Steel Construction, assuming that an unreinforced dead load and a wind load, each equal to the A.P.I. capacity, are applied with proper distribution over the entire unreinforced structure. All determinations of strengths of joints, girts, and braces of a reinforced derrick shall be made in accordance with Paragraph 5, "Allowable Stresses," shown in code of "Standard Specifications for Structural Steel for Buildings," June 1, 1923, of the *American Institute of Steel Construction, assuming that a reinforced dead load and a wind load, each equal to the A.P.I. capacity, are applied with proper distribution over the entire reinforced structure. For every A.P.I. steel derrick given an "A.P.I. dead load capacity with leg reinforcing" rating on the name plate, the strengths of joints, girts, and braces shall be designed for the reinforced condition, irrespective of whether or not delivery of the reinforcing legs is called for simultaneously on the purchaser's order. All girts and braces figured for compression shall be classified as "secondary members" and their l/r ratio shall not exceed 200.

4-i. Maximum Dead Load Capacity: The dead load under which failure of an A.P.I. unreinforced or reinforced derrick may be expected can be given only as approximately twice the respective A.P.I. dead load capacities, but this information shall not appear on the nameplate.

*Specifications to be added for wood used for relegging or reinforcing.

*Refer American Institute of Steel Construction code of "Standard Specifications for Structural Steel for Buildings," June 1, 1923, Paragraph 5-b, page 39 as published in bulletin entitled "Steel Construction." Seventh Edition, October 1, 1924.

Four 10x4½x10 Type XOB-2 Compressors in a plant of the Kingwood Oil & Gas Company.



Ingersoll-Rand Offices in the Oil Fields.

Butte
Birmingham
Dallas
El Paso
Los Angeles
New Orleans
Salt Lake City
San Francisco
Seattle
St. Louis
Tulsa

Many of the Oil Producers are standardizing on

Ingersoll-Rand Type XOB Compressors

These machines are built especially for air and gas lift service.

Cylinder combinations to meet any pressure demands are stocked in warehouses throughout the oil fields.

INGERSOLL-RAND COMPANY—11 BROADWAY, NEW YORK CITY
Offices in principal cities the world over.
FOR CANADA REFER—CANADIAN INGERSOLL-RAND CO., LIMITED, 10 PHILLIPS SQUARE, MONTREAL, QUEBEC

888-C

Ingersoll-Rand

ART GOEBEL WON WITH PHILLIPS *Gasoline*

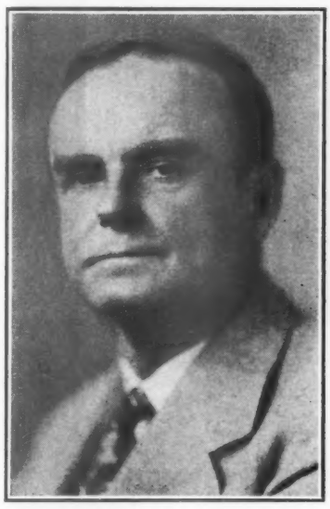
The above wireless message to Billy Parker, test pilot for the Phillips Petroleum Company, tells its own story.

The high quality and absolute dependability of the PHILLIPS Aviation Gasoline used by Art Goebel in his victorious flight in the "Woolaroc" from San Francisco to Honolulu is characteristic of all Phillips natural gasoline products.

PHILLIPS PETROLEUM COMPANY
Bartlesville, Oklahoma

PHILLIPS
Aviation Gasoline

4-j. Dead Load Capacity of Gin Pole: The dead load capacity of the gin pole, expressed in pounds, shall be determined in accordance with Paragraph 5, "Allowable Stresses," shown in the code of "Standard Specifications for Structural Steel for Buildings," June 1, 1923, of the *American Institute of Steel Con-



JOHN B. CORRIN
Rigs and Derricks.

struction, and shall be specified on the name plate.

4-k. Weight: The A.P.I. weight of an unreinforced derrick shall include all leg sections, all girts, all bracing members, water-table beams, gin pole, ladder, foundation plates, bolts and clamps for fastening above members together, and bull wheel and calf wheel girts if furnished. The A.P.I. weight shall be the net weight of the derrick steel and cast material with the protective covering applied.

4-l. Computation Details: In addition to compliance with the A.P.I. Standard Rules and Conditions contained herein, for every different design of derrick marked with the A.P.I. monogram, each manufacturer shall furnish upon request from the Division of Standardization of the American Petroleum Institute all details of his computations or drawings as may be necessary for a complete checking against these specifications; it being understood that such information furnished is only for the

CHARLES H. SHERMAN
Rigs and Derricks.

use and inspection of duly authorized agents of the Special A.P.I. Committee on the Standardization of Standard Rigs and Derricks, and that when these agents finish with this data it will be returned to the manufacturer furnishing same, which manufacturer shall preserve such data for inspection should it again be requested by the Division of Standardization of the American Petroleum Institute. (Subject to revision at next committee meeting.)

*See footnote referred to in Paragraph 4-d-1.

SECTION 5
COMBINATION WOOD & STEEL DERRICK DIMENSIONS

Special Note: Authority to use the A.P.I. monogram on Combination Wood and Steel Derricks cannot be granted until the specifications on strength and capacity requirements are completed. Manufacturers of this type derrick, however, are urged to follow the main dimensions given in Table 3, as well as the specifications relating to standard rig parts, as contained herein.

DEFINITIONS OF MEASUREMENTS

5-a. Derrick Heights: The height dimension "A" shall be measured along the neutral axis of the derrick leg from the top of the derrick floor joists to the extreme top of derrick or top of water table beams or bumpers, with a tolerance of plus 12 inches minus zero.

5-b. Derrick Bases: Shall be square and base dimension "B" shall be the measurement from outside to outside of adjacent derrick legs, measured at the top of the derrick floor joists, with a tolerance of plus zero minus 4 inches.

5-c. Water Table Opening: Shall be square, and water table opening dimension "D" shall be the inside or in-the-clear measurement of the opening in the water table, with a tolerance of 2 inches plus or minus.

5-d. Derrick Heights, Bases, and Water Table Opening: The standard sizes of A.P.I. combination wood and steel derricks shall be as specified in Table 3. The four sizes may be referred to by number, and each size shall have only the particular combination of height "A", base square "B" and water table opening "D" as given.

TABLE 3
A.P.I. COMBINATION WOOD AND STEEL DERRICK STANDARD SIZES
See Figure 1

	Height		Base Square		Water Table Opening	
Size No.	Nominal "A"	Tolerance	Nominal "B"	Tolerance	Nominal "D"	Tolerance
20.	122 ft. 0 in.	+12 in.—0	24 ft. 0 in.	+0 in.—4 in.	5 ft. 6 in.	±2 ft.
21.	87 ft. 0 in.	+12 in.—0	24 ft. 0 in.	+0 in.—4 in.	5 ft. 6 in.	±2 ft.
22.	80 ft. 0 in.	+12 in.—0	22 ft. 0 in.	+0 in.—4 in.	5 ft. 6 in.	±2 ft.
23.	73 ft. 0 in.	+12 in.—0	20 ft. 0 in.	+0 ft.—4 in.	4 ft. 4 in.	±2 ft.

5-e. Gin Pole: The gin pole shall be constructed so as to extend across the center of the water table opening. The clearance between the gin pole and the base of the crown block shall be 8 feet, 0 inch minimum. See "E" Figure 1.

5-f. Window Opening: On combination wood and steel derricks for rotary drilling the minimum window opening height shall be 24 feet, 0 inch in the clear, measured parallel to the center line of the derrick side from the top of the floor joists, less the thickness of the roller, and a calf wheel girt with braces (for attachment to Sampson post) shall be provided for cable tool work. This girt shall extend either from derrick leg to derrick leg, or from calf-wheel derrick leg to a suitable post located adjacent to Sampson post. See "F", Figure 1.

5-g. Bull Wheel Girt Clearance: The distance in the clear from the bull wheel girt to the top of the derrick floor joists shall be 9 feet, 6 inches measured parallel to the center line of the derrick side, tolerance of plus or minus one-half inch. See "G", Figure 1.

5-h. Center of Drill Hole: The center of the drill hole shall be 6 inches from the center of the derrick base on the center line toward the Sampson post with a tolerance of plus or minus one-half inch. See "Q", Figure 1.

Section 6—Combination Wood and Steel Wooden Leg Derrick Strength and Capacity Requirements

6-a. Structural Material: Structural lumber used in the construction of A.P.I. combination wood and steel derricks shall be new and shall conform to the requirements of the American lumber standards for dense select and select grades as given in the revised simplified practice recommendation No. 16 of the United States Department of Commerce. Structural steel used in the construction of A.P.I. combination wood and steel derricks shall be new and shall conform to the requirements of the American Society for Testing Materials, "standard specifications for structural steel for buildings," serial designation A-9-24, as amended to date. Tubular steel used in construction of A.P.I. combination wood and steel derricks shall be new and shall conform to A.P.I. pipe specifications as amended to date. (See A.P.I. standards No. 5-a.)

6-b. Unreinforced Dead Load Cacacity: The A.P.I. dead load capacity of an A.P.I. derrick without leg reinforcing, expressed in pounds, shall be the gross capacity of the derrick, and shall be specified on the nameplate. It shall be equal to the sum of the strength of the four unreinforced legs at their weakest section.

6-c. Reinforced Dead Load Capacity: The A.P.I. dead load capacity of an A.P.I. derrick, with wooden leg reinforcing, expressed in pounds, shall be the gross capacity of the derrick when reinforced with properly applied reinforcing legs of a particular size. It shall be equal to the sum of the strengths of the four reinforced legs at their weakest section, the strength of each reinforced leg to be the sum of the strengths of the two or more leg elements.

6-d. Dead Load Capacity Determinations: The A.P.I. dead load capacities of A.P.I. derricks shall be determined by computing the sum of the strengths of the four leg members at their weakest section, considering same as columns unsupported between adjacent panel points, and determined in accordance with the American Railway Engineering Association column formula for safe loads for wooden columns as given in Bulletin 289, Volume 28, Pages 68 and 69 of the American Railway Engineering Association. The safe unit stress in compression parallel in grain to be used in the formula of this specification shall be 1,065 pounds per square inch. This formula shall apply to wooden leg derricks in which the lumber used is within the specification for dense select and select Douglas fir or southern pine of the American Lumber standards.

6-e. Wind Load Capacity: The A.P.I. wind load capacity of an A.P.I. derrick, expressed in miles per hour, shall be the maximum wind velocity that the unboarded derrick can withstand without failure, assuming the four legs to be anchored solidly and the derrick to be unguyed, and shall be specified on the nameplate. Every A.P.I. combination wood and steel derrick shall have a minimum A.P.I. wind load capacity of 70 miles per hour.

6-f-1. Wind Load Capacity Determinations: The unit wind load, expressed in pounds shall be determined by the formula to wit:

$$P = .004\ V^2$$

where "V" is the wind velocity in miles per hour.

"P" is the pressure in pounds per square foot of exposed area.

6-f-2. The unit wind load shall be considered to be applied to the exposed area of two parallel sides of the unboarded derrick and also to a set back of pipe assumed standing within the derrick. Exposed areas of pipe set backs shall have the assumed dimensions given in Table 4, Column 2 and shall be assumed vertical with one end on the derrick floor. The horizontal pressure or horizontal component of the weight of this set back of pipe shall be assumed as given in Table 4, Column 3 acting horizontally in the same direction as that of the wind at a height above the derrick floor equal to one-half the height of the set back of pipe. The algebraic sum of the two horizontal forces shall be applied at the finger board 24 inches from the adjacent derrick side.

TABLE 4
A. P. I. WIND LOADING ON PIPE SET BACKS

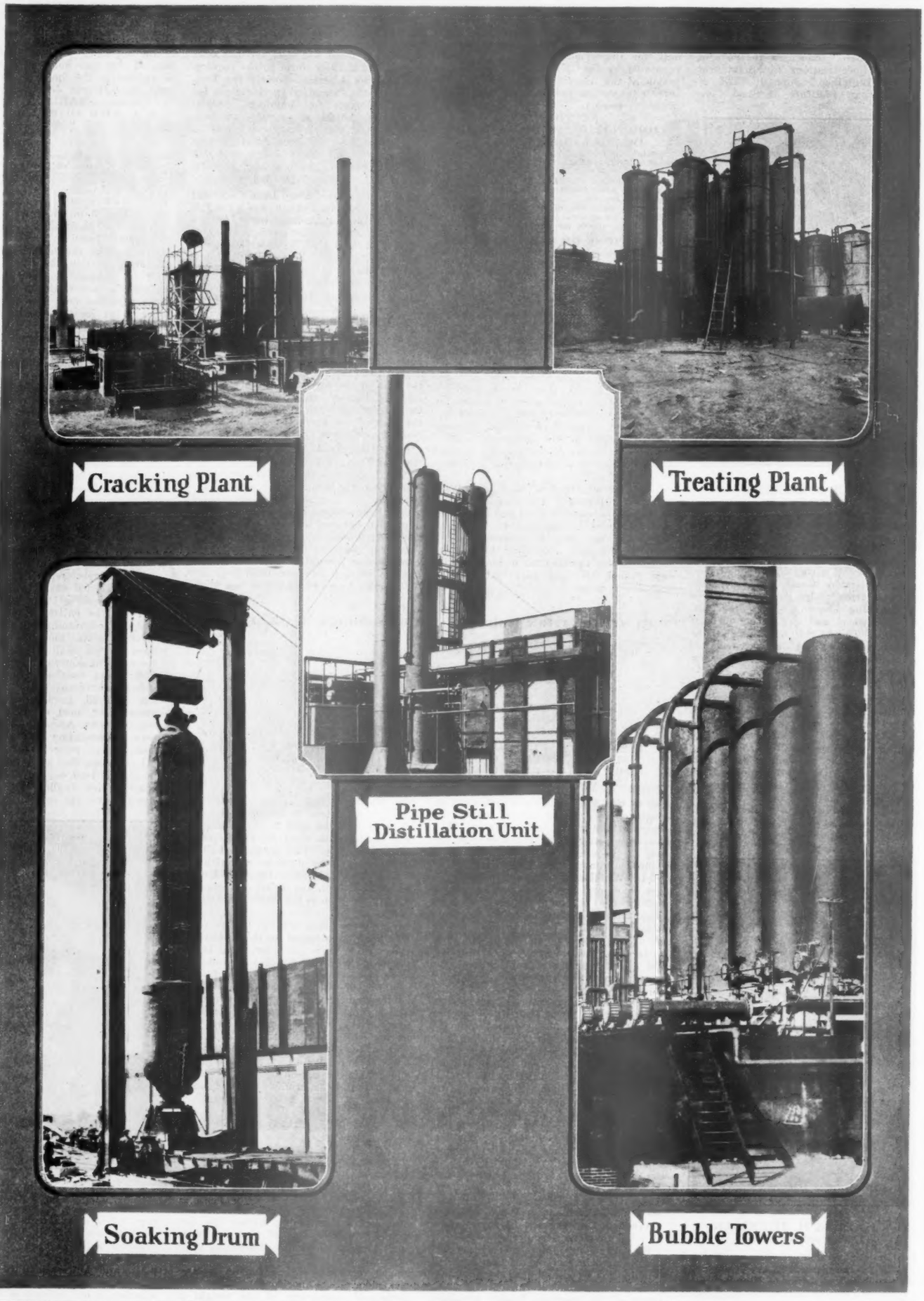
Derrick Heights	Exposed Areas Assumed Dimensions		Horizontal Component of Pipe Wgt. Lbs.
122'0"	3'8" Wide	90'0" High	7,050
87'0"	3'8" Wide	67'6" High	5,275
80'0"	3'8" Wide	67'6" High	5,275
73'0"	2'7" Wide	65'0" High	2,230

6-g. Leg Joint Requirements: The ends of the abutting leg sections shall be properly faced to give uniform bearing throughout the derrick. For the unreinforced derrick the connecting joints shall be designed to hold the abutting leg sections accurately in alignment under a combined dead load and wind load equal to at least the A.P.I. capacities. For the reinforced derrick the connecting joints shall be designed to hold the abutting leg sections accurately in alignment under a combined reinforced dead load and wind load equal to at least the A.P.I. capacities. This design shall incorporate factors of safety as specified in Paragraph 6-h, following.

6-h. Joint Girt and Brace Capacities: All determinations of strengths of joints, girts, and braces of unreinforced derrick shall be made in accordance with the American Institute of Steel Construction code of "standard specifications for structural steel for buildings," June 1, 1923, Paragraph 5, "allowable stresses" for steel members and in accordance with American Railway Engineering Association standards for wood members (as referred to in Paragraph 6-d) assuming that an unreinforced dead load and a wind load, each equal to the A.P.I. capacity, are applied with proper distribution over the entire unreinforced structure. All determinations of strengths of joints, girts, and braces of a reinforced derrick shall be made in accordance with the American Institute of Steel Construction code of "standard specifications for structural steel for buildings," June 1, 1923, Paragraph 5, "allowable stresses" for steel members and in accordance with American Railway Engineering Association standards for wood members (as referred to in Paragraph 6-d) assuming that a reinforced dead load and a wind load, each equal to the A.P.I. capacity, are applied with proper distribution over the entire reinforced struc-

R. G. HAMAKER
Rigs and Derricks.

ture. For every combination wood and steel derrick given in "A.P.I. dead load capacity with leg reinforcing" rating on the nameplate, the strengths of joints, girts, and braces shall be designed for the reinforced condition, irrespective of whether or not delivery of the reinforcing legs is called for simultaneously on the


Cracking Plant
Treating Plant
Pipe Still
Distillation Unit
Soaking Drum
Bubble Towers

Engineering and Construction

CONDITIONS caused by the present over-production and surplus of crude are emphasizing to refiners the fact that profitable operation is contingent to a considerable degree upon the design and construction of their plants and plant equipment.

Plants which have not kept pace with developments in modern process equipment—those which have been designed without due consideration to future additions and improvement—and those which have an excessive operating expense—are finding it increasingly difficult to meet the keen competition which exists today.

Profits cannot be expected unless obsolete equipment is replaced with more modern and efficient units, embodying in their design and ingenuity and technical knowledge requisite to maximum yields and minimum costs.

THE recently completed construction portrayed on the opposite page denotes the diversity of our activities in refinery design and construction.

We are designing, furnishing and installing equipment in all parts of the country, and number among our clients the largest as well as smaller refiners.

The fact that we are being awarded repeat contracts by these companies evidences their confidence in our ability to design efficient units and install same at minimum cost and with the utmost dispatch.

When considering the equipment you will require to improve operations, let us discuss the matter with you. We will, without obligation, be glad to submit our recommendations, preliminary layouts and proposals.

ASSOCIATES

The WIDDELL ENGINEERING CO.
CONSULTING ENGINEERS

ARTHUR G. McKEE & CO.
ENGINEERS & CONTRACTORS

2422 EUCLID AVE CLEVELAND, OHIO

PIPE STILLS	FRACTIONATING TOWERS	ECONOMIZERS and HEAT EXCHANGERS
SHELL STILLS	TREATING PLANTS	FILTER HOUSES
WAX PLANTS	BOILER and POWER PLANTS	PIPING and EQUIPMENT INSTALLATIONS

purchaser's order. All steel girts and braces figured for compression shall be classified as secondary members and their L/R ratio shall not exceed 200.

6-i. Maximum Dead Load Capacity: The dead load under which failure of an A.P.I. derrick may be expected can be given only as approximately twice the A.P.I. dead load capacity, but this information shall not appear on the nameplate.

6-j. Dead Load Capacity of Gin Pole: The dead load capacity of the gin pole, expressed in pounds, shall be determined in accordance with the American Institute of Steel Construction code of "standard specifications for structural steel for buildings," June 1, 1923, Paragraph 5, "allowable stresses" for steel members, and in accordance with the American Railway Engineering Association standards for wood numbers, and shall be specified on the nameplate.

6-k. Weight: The A.P.I. weight of an unreinforced derrick shall include all leg sections, all girts, all bracing members, water-table beams, gin pole, ladder, foundation plates, bolts and clamps for fastening above members together and bull wheel and calf wheel girts if furnished. The A.P.I. weight shall be the net weight of the derrick wood, steel and cast material with the protective covering applied.

6-l. Computation Details: In addition to compliance with A.P.I. standard rules and conditions contained herein for every different design of derrick marked with the A.P.I. monogram, each manufacturer shall furnish upon request from the division of standardization of the American Petroleum Institute all details of his computations or drawings as may be necessary for a complete checking against these specifications; it being understood that such information furnished is only for the use and inspection of duly authorized agents of the Special A.P.I. Committee on the standardization of standard rigs and derricks and that when

W. F. HUFF
Standard Rigs and Derricks.

these agents finish with this data it will be returned to the manufacturer furnishing same, which manufacturer will preserve such data for inspection should it again be requested by the division of standardization of the American Petroleum Institute. (Subject to revision at next committee meeting.)

Section 7—Derrick Accessories

7-a-1. Safety Platforms and Working Boards: A.P.I. nomenclature for working board shall be "single board," "double board," "triple board," "quadruple board," and "rod board."

7-a-2. A.P.I. nomenclature for safety platforms shall be "single safety platform," "double safety platform," "triple safety platform," "quadruple safety platform," "rod safety platform," and "crown safety platform."

7-a-3. Platforms provided at ladder junctions shall be known as "ladder landing platforms."

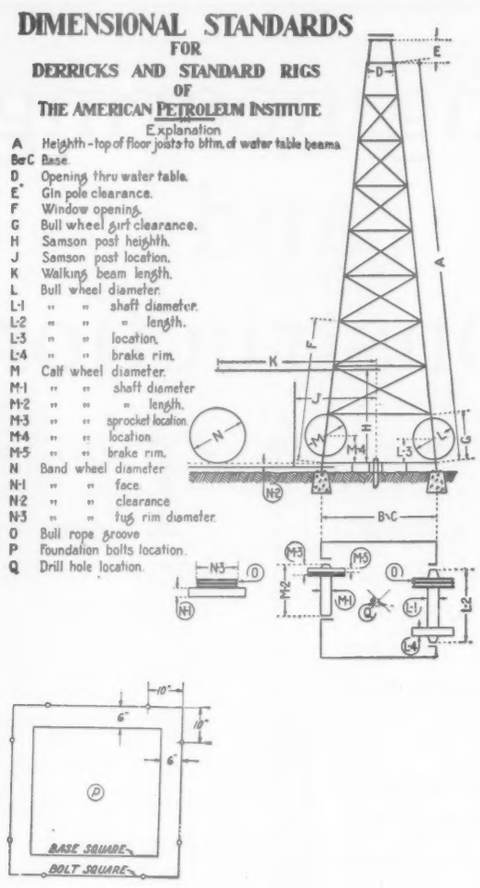

DIMENSIONAL STANDARDS
FOR
DERRICKS AND STANDARD RIGS
OF
THE AMERICAN PETROLEUM INSTITUTE
Explanation
A Heighth - top of floor joists to bttm. of water table beams
B&C Base.
D Opening thru water table.
E Gin pole clearance.
F Window opening.
G Bull wheel girt clearance.
H Samson post heighth.
J Samson post location.
K Walking beam length.
L Bull wheel diameter.
L-1 " " shaft diameter.
L-2 " " " length.
L-3 " " location.
L-4 " " brake rim.
M Calf wheel diameter.
M-1 " " shaft diameter.
M-2 " " " length.
M-3 " " sprocket location.
M-4 " " location.
M-5 " " brake rim.
N Band wheel diameter.
N-1 " " face.
N-2 " " clearance.
N-3 " " tug rim diameter.
O Bull rope groove.
P Foundation bolts location.
Q Drill hole location.
BASE SQUARE
BOLT SQUARE

Figure 1

SECTION 8
Standard Rig Parts

8-a. Sampson Post Height: The height of the sampson post shall be sufficient to give a distance of either 15 feet or 18 feet from the top of derrick floor to the top of walking beam, measured when the walking beam is in a horizontal position, with a tolerance of 3 inches plus or minus. See "H," Figure 1.

8-b. Sampson Post Location: The distance between the center of sampson post and nominal center of drill hole shall be 11 feet 6 inches or 12 feet 6 inches, tolerance plus-minus one-fourth inch.

8-c. Walking Beams: The length "K" of the walking beam shall be sufficient to give working points of 11 feet 6 inches or 12 feet 6 inches, tolerance plus-minus one-fourth inch. (The "working points" are defined to be equivalent to "J" in Figure 1.)

8-d. Bull Wheel Diameters: The outside diameters of the brake and tug rims of the bull wheel shall be 8 feet no inches, tolerance plus-minus one-fourth inch. See "L," Figure 1.

8-e. Bull Wheel Brake Rim Width: The width of the face of the brake rim on the bull wheel shall be 9 inches or 12 inches, with a tolerance of plus or minus one-eighth inch for steel-faced wheels, and of plus or minus one-half inch for wooden-faced wheels. See "L-4," Figure 1.

8-f. Bull Wheel Shaft Diameter: The outside diameter of the bull wheel shaft shall be 13 inches, 16 inches or 18 inches, tolerance plus-minus one-eighth inch. See "L-1," Figure 1.

8-g. Bull Wheel Shaft Length: The length of the bull wheel shaft, measured from shoulder to shoulder of gudgeons, shall be 13 feet 6 inches, tolerance plus-minus one-eighth inch. See "L-2," Figure 1.

8-h. Bull Wheel Shaft Box Height: The distance from the centers of the bull wheel shaft boxes to the top of the derrick floor joists shall be 4 inches—8 inches plus or minus one-eighth inch, measured in the plane of the side of the derrick and parallel to the center line of the side. See "L-3," Figure 1.

8-i. Calf Wheel Diameter: The diameter of the calf wheel shall be 7 feet 6 inches, tolerance plus-minus one-fourth inch. See "M," Figure 1.

8-j. Calf Wheel Brake Rim Width: The width of the face of the brake rim on the calf wheel shall be 9 feet or 12 feet, with a tolerance of plus or minus one-eighth inch for steel faced, and plus or minus one-half inch for wooden faced. See "M-5," Figure 1.

8-k. Calf Wheel Shaft Diameter: The outside diameter of the calf wheel shaft shall be 16 inches or 18 inches, tolerance plus-minus one-eighth inch. See "M-1," Figure 1.

8-l. Calf Wheel Shaft Length: The length of the calf wheel shaft, measured from shoulder to shoulder of gudgeons, shall be 6 feet 3 inches, tolerance plus-minus one-eighth inch. See "M-2," Figure 1.

8-m. Calf Wheel Tug Sprocket Location: The distance from shoulder of outer gudgeon of calf wheel shaft to center line of tug sprocket shall be 1 foot 6 inches, tolerance plus-minus one-fourth inch. See "M-3," Figure 1.

8-n. Calf Wheel Shaft Box Heights: The distance from the floor joists to the center of calf wheel shaft boxes shall be 6 feet 6 inches at the sampson post and 6 feet 9 inches at the derrick leg end measured in the plane of the side of the derrick and parallel to the center line of that side. Tolerance plus-minus one-eighth inch. See "M-4," Figure 1.

8-o. Band Wheel Diameter: The outside diameter of the band wheel shall be 11 feet no inches or 12 feet no inches, with a tolerance of plus zero minus 1 inch. See "N," Figure 1.

8-p. Band Wheel Face Width: The width of the face of the band wheel shall be 14 inches, 16 inches or 18 inches, with a tolerance of one-half inch plus or minus. See "N-1," Figure 1.

8-q. Band Wheel Clearance: The clearance under the band wheel shall be 6 inches minimum. See "N-2," Figure 1.

8-r. Band Wheel Tug Rim Diameter: The outside diameter of the band wheel tug rim shall be 7 feet no inches, tolerance plus-minus one-fourth inch. See "N-3," Figure 1.

8-s. Bull Rope Grooves: The bull rope grooves in the tug rims of the bull wheel and band wheel shall be made for 2½-inch rope as standard; the included angle between the sides of each groove shall be preferably 60 degrees, but in no case greater than 80 degrees; the depth of groove shall be not less than 2⅛ inch nor more than 2⅝ inches, the bottom of the grooves shall be rounded to a radius of not more than five-eighths inch; the top edges of the grooves shall be rounded to a radius of not less than one-half inch. There shall be two grooves in each tug rim. See "O," Figure 1.

8-t. Band Wheel and Drive Pulley Shaft Spacing: The distance between the center line of the drive pulley and the center line of the band wheel shall be 32,* 42 or 50 feet (Tentative: Subject to revision.)

8-u. Chain-Driven Band Wheel and Drive Sprocket Spacing: The distance between the center line of the driving sprocket and the center line of the band wheel shall be 16 feet no inches.* (Tentative: Subject to revision.)

Section 9—Standard Rig Strength and Capacity Requirements

9-a. Safe Working Load Capacity for Sampson Post: The A.P.I. safe working load capacity for the "A.P.I. dimensional standard" steel Sampson post, expressed in pounds, shall be determined in accordance with Paragraph 4, "loading," and Paragraph 5, "allowable stresses," shown in code of "standard specifications for structural steel for buildings," June 1, 1923, of the *American Institute of Steel Construction, and shall be marked upon the post.

Note: The A.P.I. safe working load capacity determination of "A.P.I. dimensional standard" steel walking beams is to be developed by the engineering subcommittee and manufacturing committee, and recommendations are to be presented at the next annual meeting.

Section 10—A.P.I. Marking

10-a. Derricks manufactured in accordance with these specifications shall be identified by an A.P.I. name plate carrying raised or stamped lettering; size of lettering to be at least one-eighth inch high, and size of A.P.I. monogram one-half inch high, substantially as illustrated. This name plate is to be securely located in a conspicuous place on the starting leg or first girt.

10-b. This plate shall bear the following information:

Date of Derrick Specifications .....;
Mfg's. Serial No. .....; Size No. .....
Weight ....lbs., Height ....; Base Sq. ....;
Water Table Opening .....;
A.P.I. Dead Load Capacity without Leg Reinforcing .....lbs.;
A.P.I. Dead Load Capacity with Leg Reinforcing (if any) .....lbs.;
Leg Reinforcing Size (if any) .....
.....
(Size, weight per foot, and type of sections)
A.P.I. Wind Load Capacity ....Miles per. hr.
(70 is minimum allowable)
A.P.I. Gin Pole Capacity .....lbs.;
.....
(Name and Address of Manufacturer)

10-c. Bull wheels, calf wheels, band wheels, Sampson posts, and walking beams, when manufactured in accordance with all governing dimensions given herein, may be marked "A.P.I. dimensional standard," but shall not be marked with the official A.P.I. monogram.

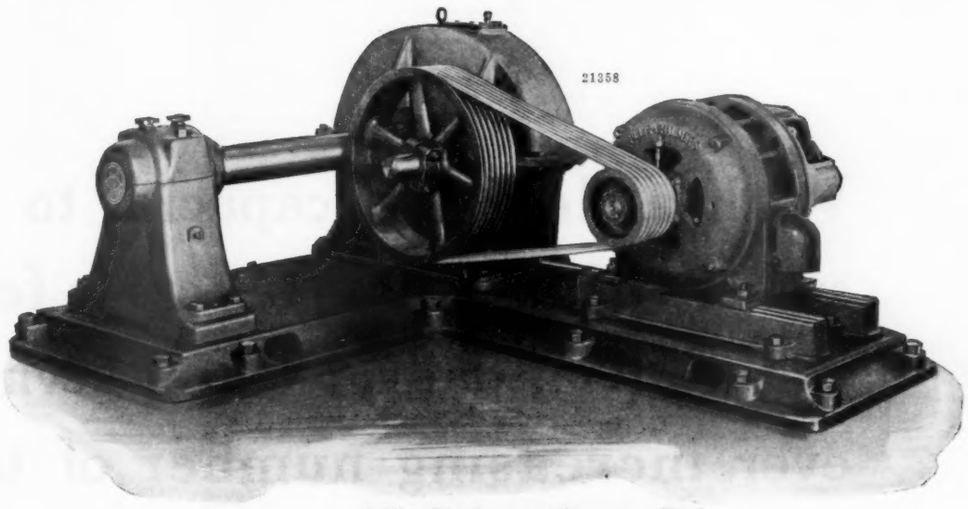
10-d. No derricks, rigs, or parts shall be marked with the A.P.I. monogram which do not comply fully with these specifications.

10-e. Authority to use the A.P.I. monogram will be granted in accordance with the rules and conditions contained in the appendix.

Section 11—Inspection and Rejection Inspection

11-a. Inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed to all parts of the manufacturer's works which will concern the manufacture of the material ordered hereunder. The manufacturer

*As recommended by the special A.P.I. committee on the Standardization of Pumping Equipment and Engines.
*See footnote referred to in Paragraph 4-d-1.



Allis-Chalmers Texrope Driven
Oil Well Pumping Unit

BE SURE TO SEE these two units, the latest and most advanced developments in oil field work.

The pumping unit will be in actual operation in connection with a derrick. It will also be on display, with the countershaft, in Booths 77 and 78.

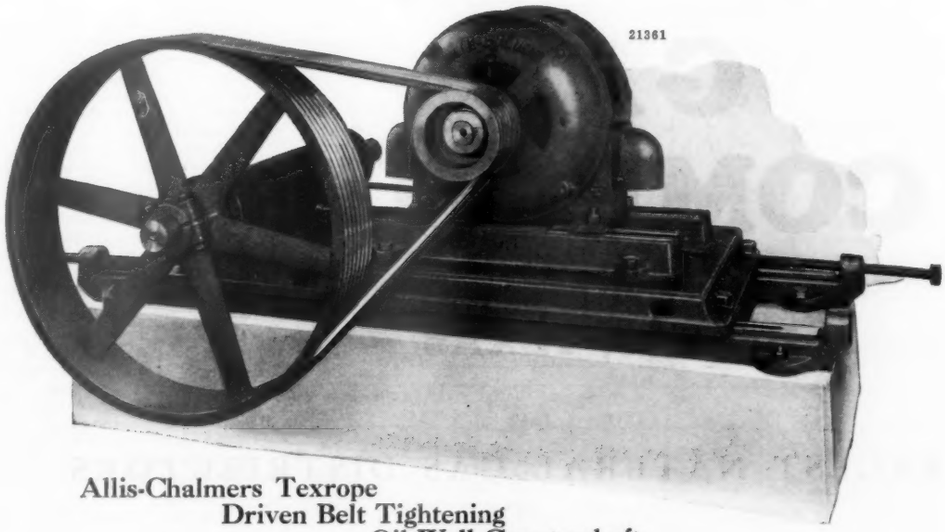
Allis-Chalmers Manufacturing Company

Booths 77 and 78, Exposition Grounds, Tulsa, Oklahoma

Main Office—Milwaukee, Wisc.

Oil Field Offices at

Houston	Dallas	New Orleans	St. Louis
Kansas City	Denver	Los Angeles	El Paso



Allis-Chalmers Texrope
Driven Belt Tightening
Oil Well Countershaft

With a delivery capacity to consumers of 240,000,000 cubic feet of Natural Gas daily, we are serving an ever increasing number of towns and cities with this ideal fuel. Eighteen years of successful service is our record!

LONE STAR GAS COMPANY

HEADQUARTERS:
DALLAS, TEXAS

TEXAS' LARGEST NATURAL GAS DISTRIBUTORS

shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

11-b. Where inspector representing the purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

Rejection

11-c. Material manufactured in accordance with these specifications which proves to be defective subsequent to acceptance at manufacturer's works or when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A.P.I. material. When material stamped or marked with the A.P.I. monogram is rejected such monogram shall be canceled as follows:

11-d. On cast material the loop in the letter "P" shall be chipped off.

11-e. On forged material, a steel canceling stencil, one-half inch square, per figure below, shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

The following recommendations on the construction of foundations, engine houses, etc., were adopted as tentative. There are certain points yet to be definitely decided. Therefore this code will be circulated in mineographed form for the present, until the next meeting of the committee in December, when it is expected it will be finally amended and approved for printing and circulation in the A.P.I. handbook.

Code of Recommended Practice When Using A.P.I. Specification Derricks

Selection

1. Size.

1-a. Height.

A.P.I. derricks can be obtained in practically all necessary heights. The selection of a derrick for height depends primarily upon the character of work to be done with the derrick selected. High derricks are generally preferred for deep holes particularly in rotary drilling as the height permits longer stands of pipe within the derrick and thus greater economy and speed can be had.

1-b. Bases: Before selecting a derrick the use to which the derrick is to be put should be carefully considered and a definite program of drilling and production should be decided upon. A.P.I. derricks can be obtained with bases of two series. Derricks with bases given in column "B" of Table 1 permits a program of interchangeability of derricks on the same foundation or the constructing of a small derrick within a large derrick on an independent foundation. Derricks with bases listed in column "C" of Table 1 permits the cutting down or building up of a common taper derrick. In other words a short pumper can be made by letting down the upper part of a driller and vice versa a driller can be made by wrapping and building under a short pumper. It will be noted that all manufacturer's derricks of a given type and base size will fit the same foundation and over the same foundation bolts.

1-c. Water Table Opening: A common size of water table opening as carried by A.P.I. derricks permits the interchangeability of crown blocks as well as provides an assured and ample working opening.

2. Capacity.

2-a. Loading: All A.P.I. derricks have a known capacity. This is an accomplishment that in the past has had practically no consideration. A.P.I. derricks can and should be selected and purchased on their capacity rating which is the most important consideration in derrick use.

2-b. Wind Resistance: All A.P.I. derricks are constructed to withsand safely, provided they are anchored to suitable foundations, a minimum wind of 70 miles per hour and some manufacturers design their derricks for even greater wind loading. Greater wind load capacity of a derrick is reflected in stronger girts, braces and joists.

Foundations

3-a. Loads or Work to Be Done: Foundations are a very important part of not only derrick erection, but also drilling operations in general, as a satisfactory derrick foundation is a guarantee against a great deal of trouble. Much loss of time, many costly repairs and even derrick failures are due directly to insufficient derrick foundations. The first consideration to be given derrick foundations is the maximum load to which they will be subjected. This can be readily obtained by adding the weight of machinery and equipment to be supported by these foundations to the capacity of the derrick which is always given in pounds.

3-b. Soil Conditions: The consideration next in importance to be given derrick foundations is the bearing value of the soil on or in which the foundations are to be placed. The bearing value of soils varies greatly. Alluvial soils frequently have as low a bearing value as 1,000 pounds per square foot, and in such low capacity soils it is generally necessary to either drive piling or in some suitable manner prevent the soils escaping by being pressed out laterally from under the foundations. Sandy soils vary in capacity from one to two tons per square foot as do the clays when in moderately thick beds and dry. A gravel or rocky material, equal to poor brick masonry, should support five to eight tons per square foot, and so on to the best of hard rock and so on to the best of hardest rock in thick layers which can support 200 or more tons per square foot. The capacity of all soils vary directly with their moisture content and it is for this reason that all derrick foundations should at all times be kept as dry as possible.

3-c. Design of Foundation: Concrete, because of its rigidity and permanency, is without question the most suitable material for derrick foundations. The manufactured derrick, and particularly the steel derrick, will not adjust itself to a poor foundation as did the old style built-up board derrick. Foundations must be so designed as to satisfactorily transfer and distribute the concentrated load put upon them through the derrick legs and carried to the bearing soil below. A recommended paper on Derrick Foundations presented before the Committee on Standardization of Standard Rigs and Derricks during the semiannual meeting in June, 1927, by J. F. Hough, Structural and Technical Bureau of the Portland Cement Association, is appended hereto. There is also appended hereto illustrations of concrete derrick foundations made by the Engineering Subcommittee, which can be used to guide the designer of satisfactory derrick foundations.

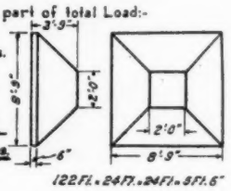
DERRICK CORNER CONCRETE FOUNDATIONS

REPRESENTATIVE COMPUTATIONS FOR THE DESIGN OF BEARING AREAS AND PUNCHING SHEAR

122 Ft. × 24 Ft × 24 Ft. × 5 Ft. 6 Ins. Reinforced Derrick.
Total wt. of 36 Stands of 6", 25#, 90'-0" Drill Pipe = 61,000 lbs.
Approx. wt. of equipment standing on Derrick floor plus base wt. = 34,000 lbs.
Safe dead load capacity of derrick as per A.P.I. Formula = 500,000 lbs.

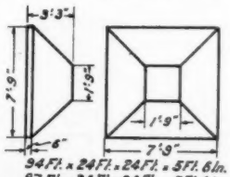
Loading on corner of Derrick which takes the greater part of total Load:-

1. Safe Dead Load.	=	125,000 lbs.
2. Shock (assumed) 50% Safe Dead Load.	=	62,500 "
3. Drill Pipe Thrust.	=	33,000 "
4. Derrick Floor equipment plus Base wt. (assumed uniformly distributed over floor)	=	8,500 "
Total Load on Derrick Pier	=	229,000 lbs.



122 Ft. × 24 Ft. × 24 Ft. × 5 Ft. 6"

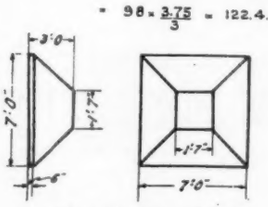
Bearing Power of soil = 3,000 lbs. per sq Ft.
Req'd bearing surface = 229,000 / 3,000 = 76.3 sq. Ft.
or Base Size = 8'-9" × 8'-9"
Direct Compressive Safe Strength of Concrete taken at 400 lbs. per sq. In.
∴ Area of Bearing Plate = 229,000 / 400 = 572.5 sq. In.
or Size of Plate & hence minimum Size of Footing top = 2'-0" × 2'-0"



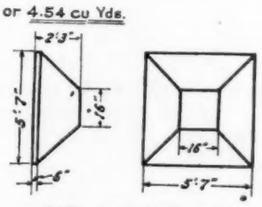
94 Ft. × 24 Ft. × 24 Ft. × 5 Ft. 6 In.
87 Ft. × 24 Ft. × 24 Ft. × 5 Ft. 6 In.

Resistance of Massed Concrete to Punching Shear = 50 lbs per □"
Let X = Least depth of Pier req'd. to resist punching shear
then:- Perimeter of Bearing Plate × X × 50
= Area of Footing − Area of bearing Plate / Area of Footing × 229,000
or X = 72.75 × 229,000 / 76.75 × 50 × 24 × 4 = 45.2 Ins. or 3 Ft. 9 Ins. say

Volume of Pier = (76.5 + 4 + 17.5) 3.75/3
= 98 × 3.75/3 = 122.4 cu. Ft. or 4.54 cu Yds.



80 Ft. × 20 Ft. × 20 Ft. × 5 Ft. 6 Ins.



73 Ft. × 20 Ft. × 20 Ft. × 4 Ft. 4 Ins.

QUANTITY OF CONCRETE REQ'D. AT EACH DERRICK CORNER TO PREVENT OVERTURN ACTION OF WIND:-

Vel. of Wind Mls./Hr.	Heighth of Derrick 122 Ft.	94 Ft.	87 Ft.	80 Ft.	73 Ft.	66 Ft.
70	5.41 cu.Yds.	2.59 cu.Yds.	2.48 cu.Yds.	2.95 cu.Yds.	1.72 cu.Yds.	0.804 cu.Yd.
80	7.215 "	3.415 "	3.2 "	3.74 "	2.29 "	1.179 "
90.	9.235 "	4.355 "	4.02 "	4.63 "	2.94 "	1.604 "
100	11.5 "	5.4 "	4.95 "	5.63 "	3.66 "	2.06 "
110	14.05 "	6.575 "	5.98 "	6.74 "	4.47 "	2.614 "
120	16.76 "	7.82 "	7.1 "	7.93 "	5.34 "	3.172 "

Name Plate Data

All A.P.I. derricks are suitably marked or identified with an A.P.I. name plate which is placed in a conspicuous place on the starting leg or first girt. There is pertinent data and information on this name plate described in Section 10 of these specifications which will be of very great value to purchasing agents, superintendents, drillers and, in fact, all who come in contact with, or have to do with the handling of, or use of the derrick. There is accurate information on this name plate that has hitherto been unknown to derrick operators or derrick users, which will undoubtedly form the basis of valuable calculations.

Care of the Derrick

5-a. Erection: In the erection of a manufactured derrick it is vitally important that all girts and braces are properly in place and all bolts and nuts tight before any loads are put on the derrick. In a manufactured derrick every detailed part has been placed to do its share of the work done by the derrick and therefore any parts which are not made to carry their proportionate part of the load tend to fail the derrick. It is also for this reason that in the erection of steel derricks so far as can be done safely, bolts and nuts be tightened only slightly tighter than finger tight until the erection of the derrick is finished, when all bolts and nuts should be gone over and drawn tight. This permits an even adjustment of all parts which results in a more nearly perfect distribution of loading.

5-b. Girts and Braces: Girts and braces or other reinforcing members of a derrick should not under any circumstances be removed from the derrick while the derrick is under load. Such removal of a grit or brace not only provides liability of derrick failure but causes a readjustment of the structure which is quite liable to cause overload of some derrick parts. If it becomes necessary to remove a girt or brace in order to permit equipment to be taken into the derrick, such girt or brace should be carefully replaced and all bolts and nuts carefully tightened before any loading is placed on the derrick. A bent girt or brace or derrick leg has practically no value as a derrick member and frequently when in a bent condition is actually damaging other members of the derrick because it is tending to pull them out of line and is putting undue stress upon them.

Avoid sudden loading when possible, as sudden loading results in great overloads which frequently cause the failure of derricks or other equipment.

5-d. Sudden Loading: As the inertia of a body or mass has to be overcome before that mass is moved if it be quiet, or stopped if it be in motion, the time of overcoming this inertia becomes a function of the power required. A quick pull or a quick stop might therefore break a line or pull in the derrick, whereas if that pull or stop were made over a period of time the equipment would not suffer. The maximum pull can of course, be gotten when applied slowly, which permits all equipment to work to its fullest capacity.

5-e. Eccentric Loading: Eccentric loading of a derrick should be avoided always as it results in overload of certain sections of a derrick beyond their capacity. Instead of shifting crown blocks to overcome the lean of a derrick the derrick should be relevelled, because the shifting of the crown block causes eccentric loading and thereby the overloading of some derrick parts. At no time should tanks, separators or like equipment be attached to the side of a derrick which causes very bad eccentric loading. When pulling with the calf wheel, for instance, it is much more desirable to attach the dead line to a der-

(Continued on Page 298)

Vital Importance of Uniform Gauges

Standardization of Dimensions Declared First Step Towards Interchangeability and in Providing Specifications

By H. W. Fletcher,
Chairman, Correlating Committee, American Petroleum Institute.

Standardization as applied to the oil industry has as its chief aim the promotion of interchangeability, and is hence concerned mainly with the dimensions of interfitting parts. A further purpose of standardization is to provide specifications for manufacture and inspection of material particularly adapted to oil country serice.

The first step in standardization of dimensions obviously is to select for each product that set of dimensions most generally acceptable to the industry as a whole. This requires adjustment of conflicting requirements from various districts, a task not always easy of accomplishment. Having finally arrived at a satisfactory standard and provided the necessary tables of dimensions, it remains to establish a system of inspection that will enable the manufacturer to produce goods in accordance with the standard, and the purchaser to determine that the material received is within specifications.

In many cases simple tables of dimensions are sufficient to enable the manufacturer to produce goods of standard size. Where individual dimensions can be separately determined with reasonable facility as in manufacturing derricks, rig irons and the like, direct measurement with scale, caliper, or micrometer, is sufficient to insure the required accuracy.

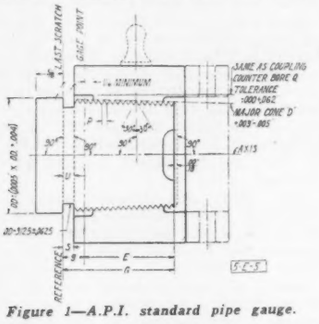


Figure 1—A.P.I. standard pipe gauge.

Screw Threads Different

Unfortunately, this is not true of screw threads, consisting as they do of seven separate elements, each subject to variation and each contributing in greater or less degree to a possible misfit. True these elements are susceptible of individual measurement, but most of them only under conditions of great precision such as are not obtainable except in the best equipped laboratories. Morover, granting that the errors of the various components have been accurately determined, prediction of the resulting fit from the observed data becomes a task of considerable mathematical complexity.

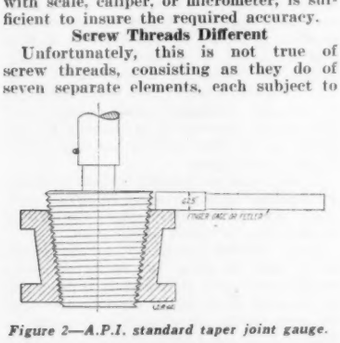


Figure 2—A.P.I. standard taper joint gauge.

The practical solution of this difficulty lies in the use of a gauge which differs in fundamental principle from the scale or micrometer, in that it measures the simultaneous and combined effect of five thread elements, namely, roundness, thread length, pitch diameter, thread angle, and lead. The common thread form is such that the other two elements, major and minor thread diameters, are not required to be checked by the gauge.

The thread gauge consists ordinarily of a threaded plug fitted to a threaded ring, both made with relatively great accuracy. The plug is a reproduction of the ideal male thread to be produced in manufacture, while the ring is used to determine the extent to which the dimensions of the work correspond with those of the plug. Figure 1 illustrates the type of gauge adopted by the American Petroleum Institute to gauge casing threads, the same general form being also used for drill pipe and tubing. A similar gauging system is now being worked out for line pipe.

Figure 2 illustrates the form of gauge adopted for cable tool and rotary tool joints, while Figure 3 shows that developed for sucker rods.

Characteristics of Products

The differences in these three types of gauges arise out of the characteristics of the product each is required to measure, the pipe joint being a simple taper thread, the tool joint being complicated by the further addition of a shoulder, and the sucker rod joint consisting of a cylindrical thread with a tapered base and also a shoulder.

Broadly then, the object of standardization is that articles produced in one shop fit, within commercial limits of variation, those produced in another, and in the case of interfitting threads this requirement involves measurement of the product with gauges which determine the collective effect of the several component dimensions of the threads.

Obviously, the gauges themselves will not be identical, but manufacturing processes have been devised so accurate that the errors in the gauges are of negligible importance compared with the allowable variation of the product. Each gauge table specifies the maximum variation allowed and the completed master gauges are inspected and certified by the Bureau of Standards. The necessary "machinery" is thus provided for placing in the hands of each manufacturer not only a table of dimensions of the part to be produced, but also a standard of comparison, of guaranteed accuracy, with which the work may be controlled.

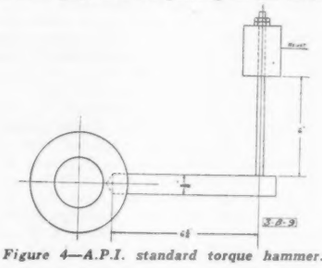
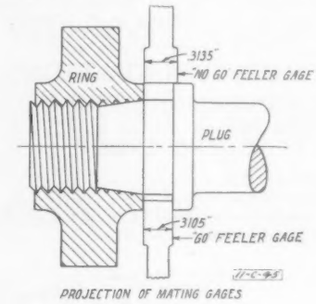
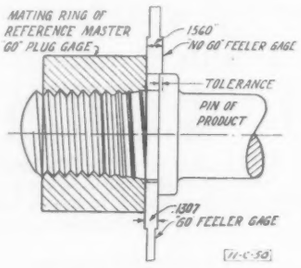


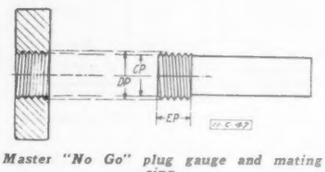
Figure 4—A.P.I. standard torque hammer.

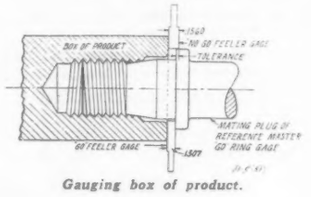
In addition to uniform tabular dimensions and gauges a third and highly important factor must be provided to insure interchangeability of product, namely a specified and uniform practice for use of the gauges. A certain variation of product from the ideal gauge fit must be allowed to permit of manufacture on a commercial scale, since the product will obviously exhibit a greater range of error than is found in the gauges. This allowance is determined partly by the service requirements of the product and partly by the exigencies of manufacturer. For instance, drill pipe threads are permitted to vary one turn plus or minus from the ideal gauge fit, making a total

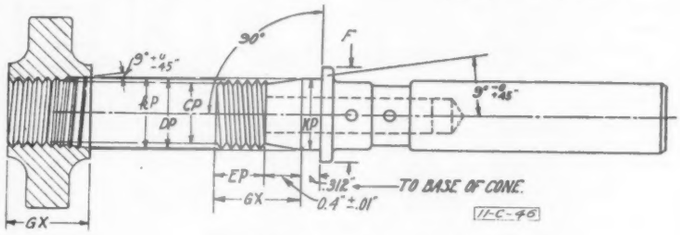
(Continued on Page 299)

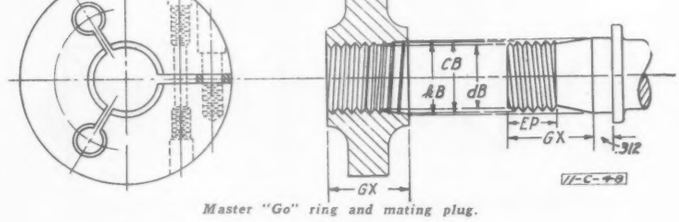












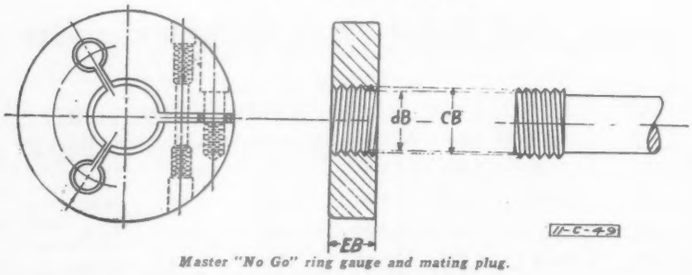


Figure 3—Sucker rod gauges and gauging practice.

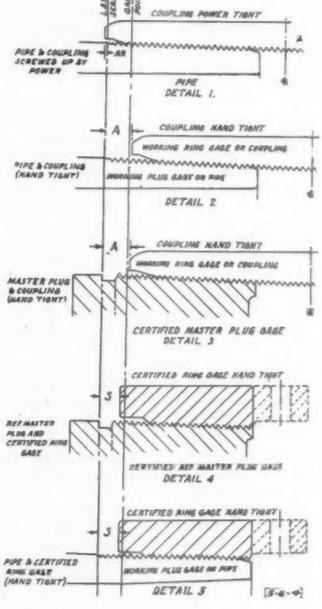
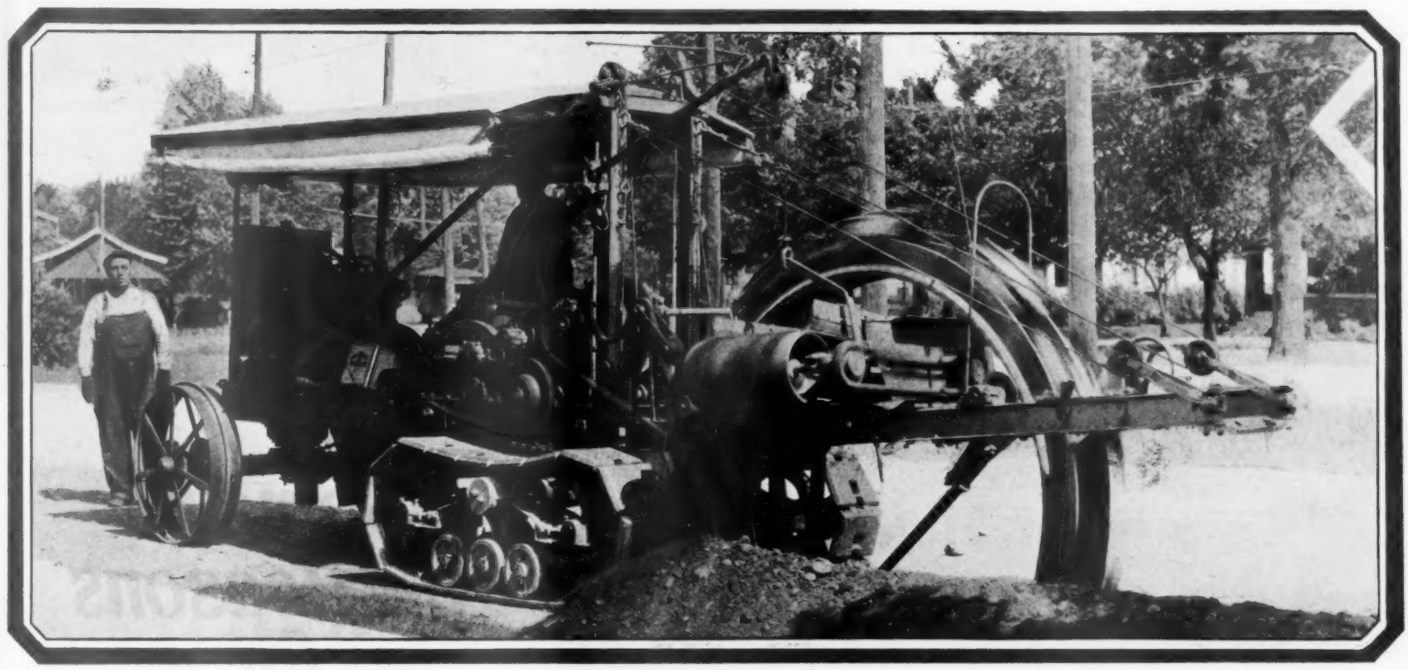


Figure 5—A.P.I. standard practice for gauging tubular materials.

"Fast On Its Feet"

in moving from one job to another
A light ditcher ~ little in size, big in ability



See this popular little ditcher at the International Petroleum Exposition, Tulsa, September 24th to October 1st. Our exhibition space is Lot H. You can easily see why this Model 15 is "fast on its feet," both in getting work done and in moving from one job to another.

MODEL 15 is the newest addition to Buckeye pipe-line ditchers which are standard gas and oil-field equipment the world over.

Compact and easily transported, it was developed especially for small-trench excavation—for service lines of every description. It works advantageously in narrow or restricted quarters where big excavators are unsuitable. Unsurpassed speed and ease of transportation are distinguishing features.

You will marvel at its great digging ability. Proportionate to its size, Model 15 cuts little ditches just as effectively and cheaply as larger Buckeyes cut big ones.

It embodies, in improved form, the rugged construction and favorite features for which all Buckeyes are famous. Finest steels, over-size power plant, steel-tread Alligator Wheels, double-driven cutting mechanism—all assure dependability and long life.

Other Buckeyes are bigger—*no ditcher is better.*

Write for this interesting bulletin. It gives general specifications and mechanical details of Model 15—a genuine Buckeye, and just the ditcher you may need.

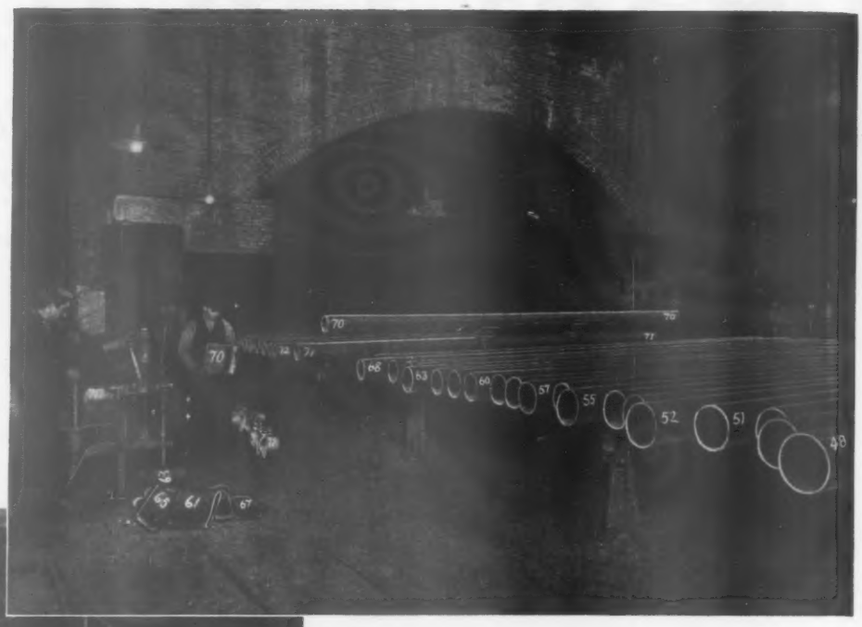
THE BUCKEYE TRACTION DITCHER CO.

FINDLAY OHIO

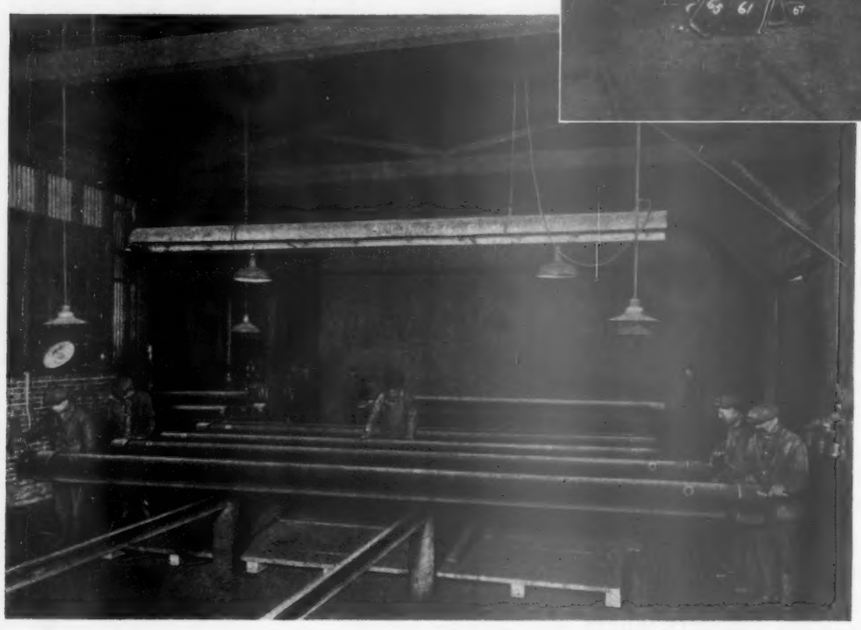
There's a Buckeye Sales and Service Office Near You

Buckeye TRENCH EXCAVATORS FOR OVER 30 YEARS

Instead of making one Crop-End Test on every few lengths, Chester makes two tests on every length, one on each end. Duplicate numbers are then compared—perfect lengths go to the oil fields—the others are scrapped.



Only after a length has successfully passed the weight test, drift test and sizing of thread tests, does it get an O. K. by Chester inspectors.



Some of the Reasons for

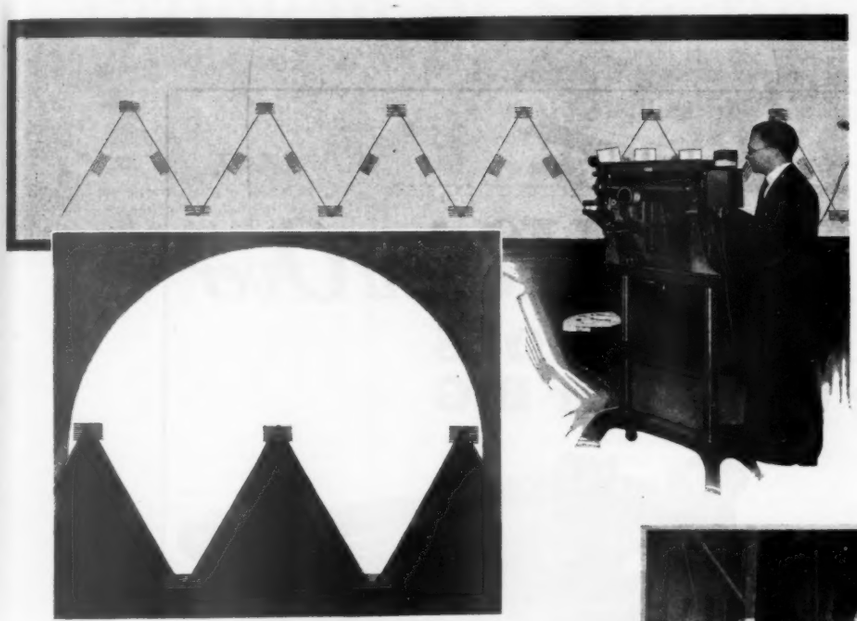
It is painstaking thoroughness in every detail of manufacture which has given Chester Casing, Pipe and Tubing such a good name in the field, where consistently dependable performance is best appreciated.

Every joint of 2″ line pipe to 12½″ casing made by Chester is as nearly perfect as modern machinery and long experienced workmen can make it. You may buy one trainload or ten trainloads of Chester Casing, Pipe or Tubing

CHESTER

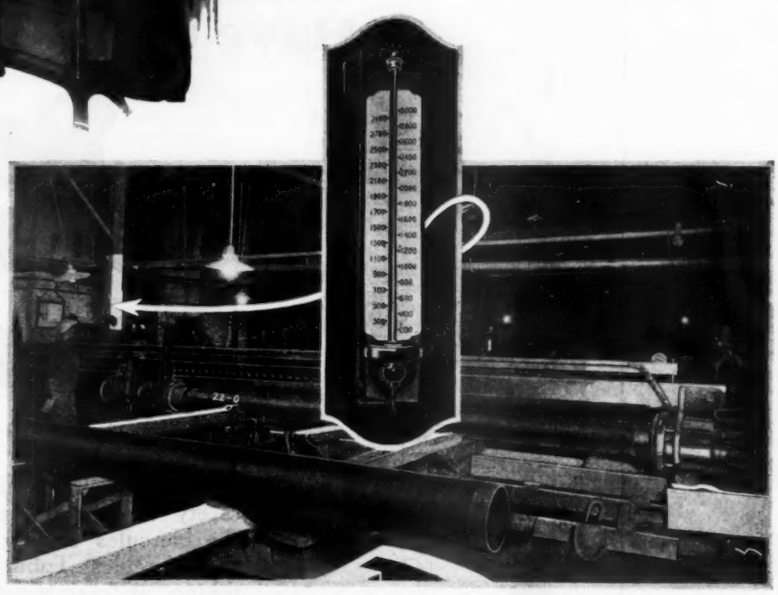
STEEL CASING

SPECIALISTS IN CASING FOR DEEP WELL DRILLING



This powerful projector throws on the screen an image of Chester threading magnified 200 times. Frequent comparison of thread samples with the chart keeps the threading uniform and accurate.

Knowing the unreliability of spring pressure gauges, Chester has installed mercury columns on its hydraulic testers so that there is no "guess work" as to the amount of pressure on each tube. This is just one of the many precautions which Chester takes to insure the utmost dependability.



Chester's High Quality

and be sure of the uniformly good quality of every length, resulting from the extreme care used in the manufacture of Chester products.

SOUTH CHESTER TUBE COMPANY
Chester, Pa.

PITTSBURGH NEW YORK HOUSTON TULSA LOS ANGELES

Also Makers of Wrought Iron Casing from 4½" to 12½"

District Sales Managers

W. E. Gibson
801 Columbia Bank Bldg.
Pittsburgh, Pa.

P. N. Guthrie, Jr.
30 Church St.
New York City

J. P. Cooney
710 A. G. Bartlett Bldg.
Los Angeles, Calif.

E. H. Bosches
2024 Houston Post Dispatch Bldg.
Houston, Texas

Distributors

Prichard Supply Co.
Mannington, W. Va.
Mather and Waynesburg, Pa.

Petroleum Supply Co.
Houston, Texas
Norphlet, Ark.

Kane Supply Co.
Kane, Pa.

United Oil Well Supply Co.
712 A. G. Bartlett Bldg.
Los Angeles, Calif.

Wagner Supply Co.
Fort Worth, Cross Plains, Breckenridge, Best, Amarillo, Borger, Brownwood and Odessa, Texas

Hillman-Cooney, Inc.
1118 Santa Fe Ave.
Los Angeles, Calif.

Midland Iron Works
Billings, Montana

Great Northern Tool & Supply Co.
Kevin, Mont., Kemmerer, Wyo.

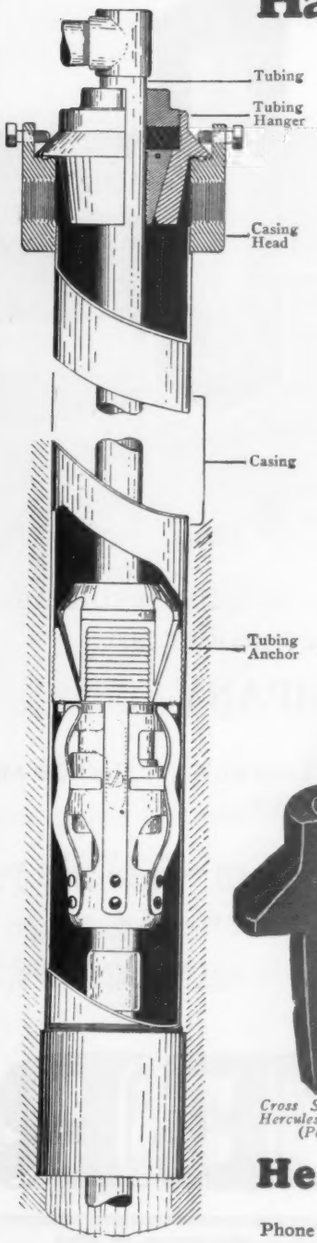
Warehouses at Houston, Texas—Thenard, Calif.

CHESTER
STEEL CASING

SPECIALISTS IN CASING FOR DEEP WELL DRILLING

LINDBERGH *Went Over*

HERCULES TOOLS
Have Gone Over BIG

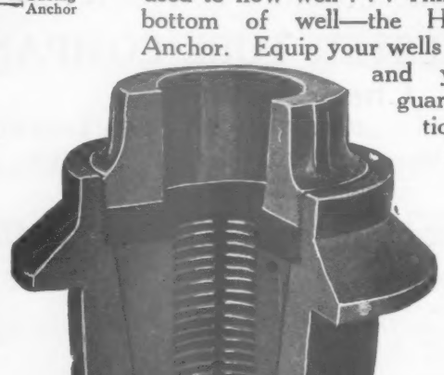


Hercules Tubing Spider

(Patented)

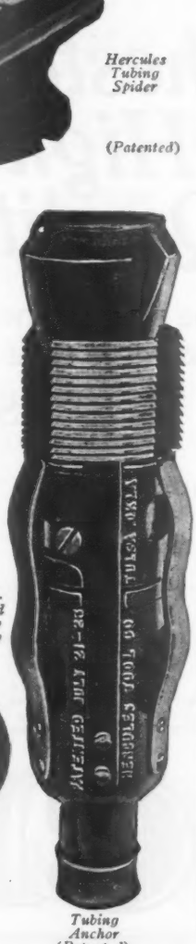
PROTECTION at the top of well . . . First; safety when running or pulling tubing—the Hercules Tubing Spider . . . Second; the Hercules Tubing Hanger supporting tubing at casinghead with its adjustable packing features, absolutely gas tight and holding any pressure where gas or air is used to flow well . . . Third; protection at bottom of well—the Hercules Tubing Anchor. Equip your wells with these three and you will have guaranteed protection, safety and maximum operating efficiency.

Write for fully descriptive literature and prices. For sale by all leading supply houses.



Cross Section View of Hercules Tubing Hanger (Patent Pending)

HERCULES TOOL TULSA



Tubing Anchor (Patented)

Hercules Tool Company

Tulsa, Oklahoma

Phone 3-2358 P. O. Box 286 507-8 Bliss Bldg.

Problem of Selecting Sucker Rods

Engineer Suggests Tests for the Essential Qualities in This Equipment

By Robert N. Burnett
Research Engineer, Humble Oil & Refining Co.

AN ENGINEERING SUGGESTION

Many splendid articles dealing with the metallurgical and manufacturing problems involved in the production of sucker rods have appeared in the past. These have been written chiefly by members of the technical staffs of the several manufacturers and they have been received eagerly and gratefully by the industry at large.

The accompanying article is, however, the first yet to appear which deals exclusively with the engineering problems confronting the oil operator who undertakes to select one or two superior quality rods for company standardization.

Mr. Burnett is research engineer for the Humble Oil & Refining Co. and the solution of engineering problems incident to the selection of equipment is a major phase of his duties.

One of the largest single items of expense on any settled production lease is the cost of sucker rods, and operators have spent much time and money in extensive field and laboratory tests in the laudable effort to find the one best rod to the end that this item of expense might be minimized. Probably there is no one best rod, but it is certain that some are better than others. It is also certain that these better rods may be discovered if one but knows what to look for; that is, what really constitutes a good sucker rod.

It is my observation that oil operators habitually pursue a needlessly round about, if not illogical, course in their costly endeavor to separate the "wheat from the chaff" among sucker rods, and that they are often unable to recognize which is which even when successful in making the separation.

The equipment engineer will customarily procure from the manufacturers a statement of the average physical properties of the steel used in each of the several makes of rods being considered. He may also secure the established chemical analyses and treatments of these steels, from which he can, if he knows something of metallurgy, predict a great many important things concerning their probable behavior in service. Usually however, he comfortably evades this possibility and confines his attention to the schedule of physicals, which is generally about as follows:

Ultimate tensile strength.
Yield point.
Per cent elongation.
Per cent reduction of area.
Hardness number (sometimes).
Tensile strength of coupling.

Inadequate Analysis

If laboratory facilities are at hand, extensive tests may be made to check up on the manufacturer's schedule of physicals, and this done, a comparative study is indulged, following which a final selection is made. Preference is usually given that steel which shows the greatest ultimate strength, the highest yield point, and the "best ductility." Regardless of the precision of such analysis, it is just as likely to favor the worst sucker rod as the best and I believe that it explains the often-heard remark of competent field men that you can't tell from a laboratory test, anything about what a string of rods will do in a hole. One can't—from such tests as these and by such means of comparison. They merely serve to entrench the practical man in his opinion that the engineer is a flighty theorist whom he will do well to avoid.

The engineer need concern himself with but two questions when examining a given sucker rod steel. They are: How efficiently will this steel function as a string of sucker rods? and: How long may it be expected to last in that service? He cannot find the complete answer to either of these questions in the foregoing schedule of physical properties. Neither can the field man find those answers by trial in the hole.

Dead Stretch

Let us concern ourselves now with the first question, which has to do with dead stretch. If we had a pump designed to operate with a 48-inch stroke, but could not actually accomplish more than a 30-inch effective stroke at the bottom of the hole, due to the excessive stretch of the rods, we might be justified in looking for another make of rod.

Rod stretch is a phenomenon known and understood by almost everyone who ever saw an oil well and its amount is always presumably computed and compensated for at the surface by stroke adjustment on the pittman crank.

Just there is the source of a serious and inexcusable error of omission. The engineer, in making his computations of total stretch due to rod and fluid weight invariably falls back on his handbooks which state that the proportional elastic elongation of steel is approximately three thousands of 1 per cent per 1,000 pounds of unit stress. If he doesn't have this information in usable form he may approximately deduce it from the modulus of elasticity and the elastic limit. Usually, however, he doesn't know the modulus of elasticity so he assumes it to be 30,000,000. He is then worse off than ever.

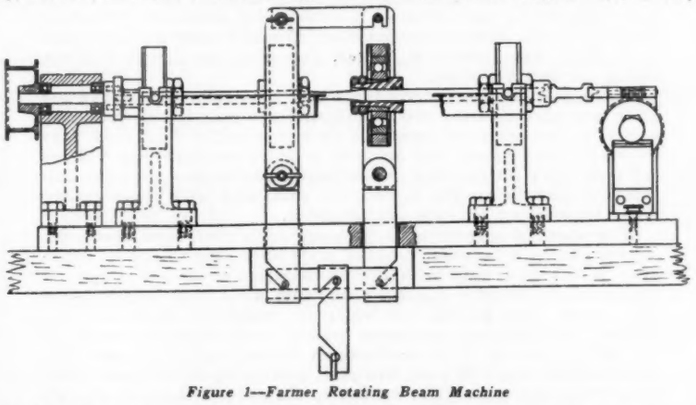


Figure 1—Farmer Rotating Beam Machine

Suppose, in any event, that he follows established custom and makes his calculations on the basis of 0.003 per cent elongation per 1,000 pounds unit stress and applies it to the case of a 5,000-foot well using the 48-inch stroke pump before mentioned which perhaps has a capacity of 1.04 gallons or 0.0213 gallon per inch in length. The total load may be sufficient to cause a stress of 15,000 pounds per square inch in the top rod. Then sticking to average values, this is equivalent to an average stress of 7,500 pounds per square inch throughout the string, which multiplied by the average elongation (0.003 per cent), indicates the total stretch to be 0.0225 per cent of the length of the string or 13½ inches absolute. Accordingly the surface stroke may be increased to 61½ inches and the job is considered done.

Incorrect Assumption

This would all be very well if the basic assumption were correct, but unfortunately it is not. There is a substantial variation in the elastic elongation of various steels and I have not found any as low as 0.003 per cent among the sucker rod steels. The range for 20 specimens representing five trade makes tested was from 0.00321 to 0.00351. Not a very great difference, perhaps, but great enough nevertheless to affect the production of a deep well by as much as 20 to 40 bbls. per day under average conditions.

According to the criteria of the foregoing example, a string of rods of that steel whose elongation factor is .00321 per cent would stretch 14.4 inches whereas the other whose factor is 0.00351 would stretch 15.8 inches. The difference is 1.4 inches or 0.03 gallon of oil per stroke in favor of the former. If the well is pumping 20 strokes per minute this means that, with the same stroke and speed at the surface, one string of rods would produce 20½ bbls. of oil per day more than the other string. Moreover, this would be done without any sensible increase in power, or other costs. With a 3-inch pump the difference would be 43 bbls.

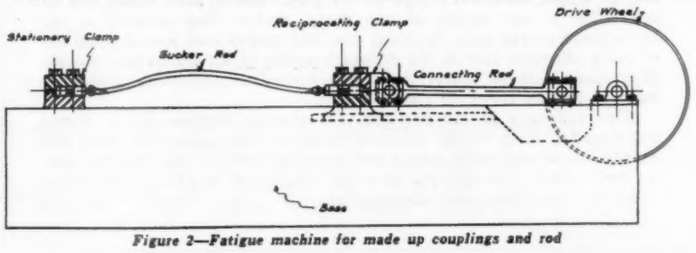


Figure 2—Fatigue machine for made up couplings and rod

It follows, then, that the elastic elongation coefficients, or the moduli of elasticity, of the steels should be a prime factor in the selection of sucker rods. These are not, of course, the only considerations for, as before stated, the user wants also to know that any string of rods he may put in a well, will give long service as well as efficient service.

Turning then to a comparative study of endurance strengths, two simple sets of tests will afford all the information necessary to an accurate prophesy regarding which rod will give the longest continued service. One test determines the fatigue endurance limit of the rod steel and so indicates which rod will be likely to give the least trouble in the way of breaks in the rod-body section. The other test determines the fatigue resistance of the made-up coupling and so indicates which rod will show the least number of pin breaks, or breaks near the pin, or other troubles resulting from the greater rigidity of the joint, as compared with the rod body. These two tests are briefly described below.

Rod Fatigue

Having at hand a standard rotating beam machine such as the one illustrated, several specimens are cut from the center section of each of the sucker rods to be tested. These specimens are turned down, filleted and precisely measured as to cross section, etc. All the specimens of one make are then consecutively tested to failure by reverse bending under decreasing loads for each specimen until one load is reached at which the specimen being tested shows no indication of failure after about 10,000,000 cycles of stress repetition. This load, then, referred to stress in pounds per square inch, is the approximate endurance limit of the steel. The maximum load initially applied is generally less than the known elastic limit of the material for the reason that the endurance limit always lies materially below the elastic limit. Several specimens should be run at, or near, the endurance limit first found so as to leave no doubt of the validity of the test results.

Another means of determining the fatigue endurance limit, and one which requires but a very short time to conduct, is known as the "rise of temperature" method. This method, perfected by Prof. H. F. Moore and associates of the engineering experiment station, University of Illinois, measures the heat of internal friction generated in a specimen which is being flexed repetitively under increasing increments of stress. The increase in temperature with increase of stress plots as a straight line up to some certain maximum stress value at which a sharp break occurs, which indicates the fatigue endurance limit of the material. This method has been checked with long time rotating beam tests so closely and so many times that there is no room for skepticism as to its reliability. If anything, it reflects the true endurance limit more accurately than does a long-time test. Photograph of the machine devised and used by Professor Moore is reproduced from Bulletin No. 124, University of Illinois Engineering Department Station. Typical rise of temperature curves are shown in Figure 3.

Fatigue of Made-Up Joint

This is perhaps the most important of all tests since it is the rigidity or inflexibility of the coupling assembly, which causes the intensification of stress at the

(Continued on Page 302)

Belting Committee Had Difficult Task

Considerable Research Work Conducted by Members to Ascertain Fundamentals to the End That Oil Producer Might Be Aided

By A. H. Riney
Chief Engineer Phillips Petroleum Co. and National Chairman A.P.I. Special Committee on Standardization of Belting

Assigned the task of developing for users suitable standards of quality on a product whose practical characteristics not yet can be fu'ly analyzed even by manufacturers, the A. P. I. Belting Committee naturally looks upon its responsibility as one involving fundamentals rather than adaptation of long-accepted facts.

We know how much to expect a given piece of steel to withstand in the way

A. H. RINEY

of an applied load. We can predict how much it will stretch when a certain stress is put into action. We can even estimate just how large a load we may apply and still expect the bar of steel to return to its original length after being elongated. There are several ways of successfully joining two pieces of metal together so that the bond is as strong as either of the pieces.

But with belts we can not feel so sure of our predictions. We are only finding out the vital characteristics of a belt structure. Yet we must look at a belt as a structure. Its characteristics are the composite of many contributing characteristics bound up in the component materials and in the methods of fabrication. Perhaps we must attribute the qua ities of a finished belt more to the character of the building processes even than to the character of the materials used.

Started Own Research

Attempts to collect fundamental belt data from existing sources have shown that no great effort has been made to study the subject in any great de a'l heretofore. Realizing existing information to be of small practical value for oil field purposes, the belt committee inaugurated its own campaign of research and field study to find out the things about the subject which it felt to be pertinent. The who'e motive was to obtain as much information as could be applied practically to the benef.t of the oil producer and his auxiliary activities.

Oil field conditions are exacting. They are severe, perhaps more so than in almost any other industry in which belts are called upon to function. We all realize it. The committee has based all its conclusions on that fact.

The committee's work, being fundamental in nature, was inherently tedious. The belt manufacturers extended great efforts in co-operating, engineers and executives gave their time, and companies donated funds. As a consequence, it is now believed that the results obtained are conclusive on some points and tentative on others, which are now being further investigated.

All of the conclusions are based on thorough tests, sufficient in number to justify acceptance. A large number of these tests were conducted in laboratories of national repute, some in the laboratories of universities, and others in those of individual companies, and in the field. Consequently, a great mass of data has been accumulated, as a basis for the specifications.

Kinds of Belts Considered

For oil country purposes, the fol'owing kinds of belts are considered of most common usage, and therefore, have received the entire attention of efforts to date: Balata, Leather, Solid Woven Cotton, Solid Woven Hair, Stitched Cotton Fabric, and Rubber.

Due to differences in materials and in methods of fabrication, certain portions of the present specifications had to be designed to these special conditions, but for the most part standard tests were applied to each type and conclusions made accordingly.

Strength of Belts

From the start, it was naturally presumed that actual belt strength was an item of fundamental importance. Determinations of strength values for good and bad belts therefore were made in the beginning. From these figures, a value for belts acceptable for oil field service was determined as the standard for each type.

A group of engineers was delegated to conduct a thorough series of tests at Hunt's Laboratory, Chicago, to study this phase of the problem. At that time, 117 tests were made on various kinds and sizes of oil field belts. Since that

PAUL ENDACOTT
National Secretary, Belting Committee

time, strength values have been determined from a much larger accumulation of tests made by the committee and by individual belt manufacturers. As a result, it has been decided that good oi field belts should be load resistant according to the following values of ultimate tensile strength.

Balata—350 pounds per inch of width per ply.

Leather—For "Single" belts, 600 pounds per inch of width.
For "Double" belts, 1,100 pounds per inch of width.

Rubber—340 pounds per inch of width per ply.

Solid Woven Cotton—For "Single" belts, 1,200 pounds per inch of width.
For "Double" belts, 2,000 pounds per inch of width.
For "Triple" belts, 2,500 pounds per inch of width.

Solid Woven Hair—For "Single" belts, 1,200 pounds per inch of width.
For "Double" belts, 1,300 pounds per inch of width.
For "Triple" belts, 1,400 pounds per inch of width.

Stitched Cotton Fabric—For belts of seven plies or less, 300 pounds per inch of width per ply.
For belts of more than seven plies, 275 pounds per inch of width per ply.

Elongation Characteristics of Belts

Closely associated with the ability to withstand the application of a large load without failure is the ability to stretch a proper amount upon the sudden application of a load. Thus by "elongating" or "giving" does a good oil field belt absorb the unusual and sudden strains thrown on it in service on a well.

For these reasons, standards have been developed on the basis of many additional tests so that the elongation characteristics of good belts might be generally known. By plotting rates of elongation of belts known to give service along

Interchangeability and Better Material Result of A. P. I. Work

By W. S. FARISH
President, Humble Oil & Refining Co.

As positive evidence that the Humble Oil & Refining Co. is definitely for standardization, we have given unstintedly our time and money to aid this movement and have been active in the work of the American Petroleum Institute Standardization Division, in its efforts to secure definite standards on all oil country material and equipment. Our engineers and other employes have devoted a large portion of their time in assisting the American Petroleum Institute on the different committees, to which they were assigned by J. Edgar Pew, chairman, Special Committee on Standardization, during the last five years.

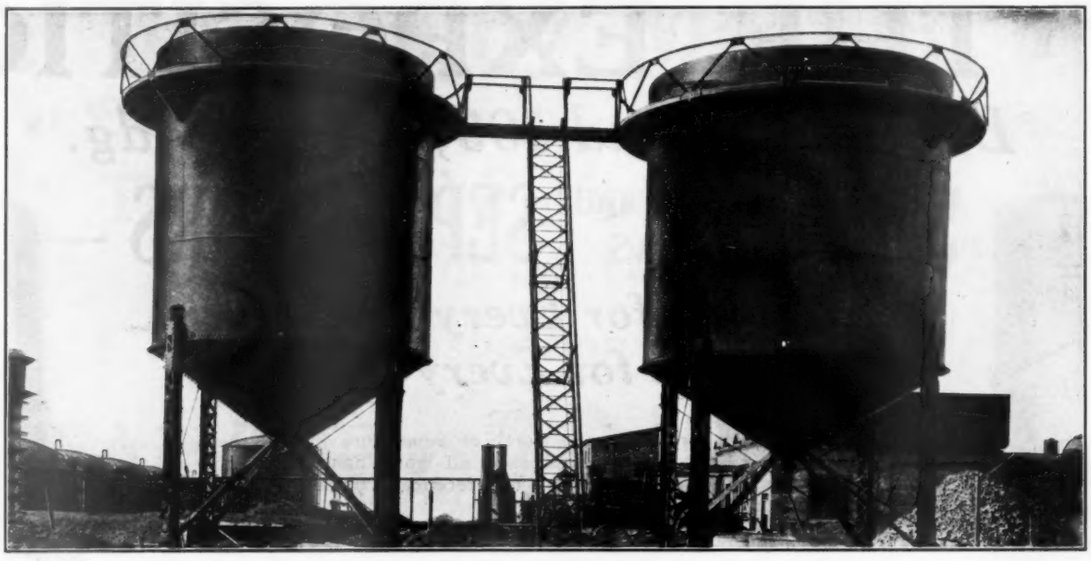
As rapidly as tentative standards have been released our field and office men have used the new specifications in ordering material and, as fast as the tentative standards were accepted and adopted, they were sent out in loose leaf booklets to every employe who had use for them with instructions to familiarize themselves with the new standards and, as rapidly as possible, consistent with conservatism, order material on the new specifications.

The standard specifications, on some equipment, have been coming out slowly, as manufacturers of some lines have not, at all times, been in hearty accord with the representatives of the users. A survey of the extent to which we are using A.P.I. standards develops that, aside from belting, on which no standards have yet been secured, and pumping equipment, which is still being analyzed, we are 100 per cent A. P. I. standards on boilers, cable tools, derricks and standard rigs, drill pipe, line pipe, tubing, rig irons and cordage, in so far as it is possible to be, due to the unfinsihed programs. We are standardized 75 per cent on rotary equipment, 50 per cent on wire lines and 25 per cent on casing.

The benefits accruing by the adoption of American Petroleum Institute standard specifications are two-fold. First, we are getting a much higher grade of material than has ever before been offered. Second, interchangeability of parts brought about a reduction of warehouse stocks with a natural decreased interest on investment. This interest saving alone has repaid us for the expense we have been put to in the last few years on this work. No longer need we hesitate to run a string of casing made up of pipe from different mills, fearing that, due to different threads and tapers, it might part or junk our hole, as A. P. I. pipe must be interchangeable as to threads and tapers.

Heretofore, a superintendent needing 4,000 feet of 6⅝-inch, 24-pound pipe to case a well and having 1,000 feet Youngstown Sheet & Tube Co.'s pipe, 2,000 feet of National Tube Co.'s pipe and 1,000 feet of Spang-Chalfant's pipe in his yard, would, nine times out of ten, order a new string of one make, rather than jeopardize the investment in the hole by using the odd makes and would continue to carry the 4,000 feet of the different makes in his warehouse stocks. Pipe manufactured under American Petroleum Institute standards must fit and he takes no chances now.

Our company is 100 per cent for standardization and is firmly convinced that it is the greatest boon to the operators, from the standpoint of economy, which has yet been offered the industry and, we feel certain that another year will find us all working along more scientific lines than ever dreamed of.



Agitators, Amarillo, Texas

Complete Service for the Oil Field

Service—by Pittsburgh-Des Moines engineers who will suggest standard tanks or design special tanks to meet your requirements.

Service—in the prompt shipment from stock of standard Pittsburgh-Des Moines field tanks of 5,000 to 80,000 barrels capacity, standard dome roof tanks of 500 to 5,000 barrels, and standard horizontal riveted and welded tanks of 75 to 26,000 gallons.

Service—in the prompt fabrication of special tanks from materials carried in stock at our shops.

Service—by trained Pittsburgh-Des Moines field crews who will install the tanks in quick time.

Back of this service is our wide and varied experience in steel tank construction during the past thirty years. Our engineers will gladly discuss your tank problems with you, without obligation on your part.

Send to our nearest office for designs and estimates of the tanks you need. For handy reference, write for our catalogs.

Pittsburgh-Des Moines Steel Company

613 Professional Bldg., Pittsburgh, Pa.
1227 Praetorian Bldg., Dallas, Texas
915 Tuttle St., Des Moines, Ia.

New York Atlanta Chicago Seattle San Francisco

PITTSBURGH DES MOINES

Pittsburgh-Des Moines Steel Company
613 Professional Bldg., Pittsburgh, Pa.

Please send me your Field Tank Catalog No. 15. I am interested in tanks of ..... barrels capacity, to be located at .....

.....

Please send me your Horizontal Tank Leaflet No. 15. I am interested in tanks of ..... gallons capacity.

Name .....
Company .....
City ..... State .....

AT THE EXPOSITION

Booths 102 and 109, Texas Bldg.

SMITH OIL and GAS SEPARATORS

A Type for Every Service
A Size for Every Need

Type 1

There's a world of difference in the worth of Separators just as there is a lot of difference between a Steinblocked all wool, hand sewn suit of shoddy—they are both suits, but there is a difference in price because there is a difference in worth.

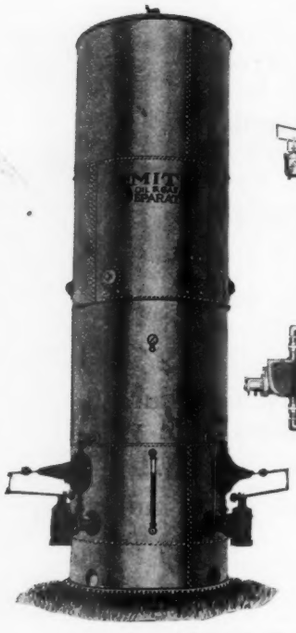
Smith Separators are not in the shoddy class. They are built to last. Their worth is in their construction—the quality of material used and the service they render.

The Smith Separator has the greatest range of actual working conditions for the investment of any equipment on the lease. The actual experience of operators substantiates the fact that they never wear out and their maintenance is practically nil.

There is a type of Smith Separator for every condition—for high pressure and low pressure—for oil, gas and water separation—for air and gas lift—for pumping wells, the Smith Separator fits the need. It is a standard piece of equipment that pays many times over for its keep and its initial cost.

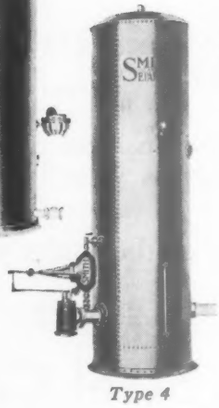
Go into any field—there you will find Smith Oil and Gas Separators handling flush production—when the flush is over a number of wells turned into one Separator—the other separators are moved on to new fields, continuing to give service.

Type 7



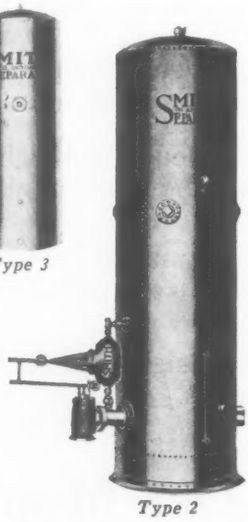
Type 10

Type 5

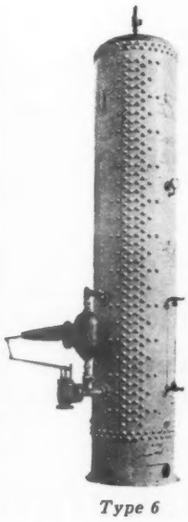


Type 4

Type 3



Type 2



Type 6

Type 9

SMITH SEPARATOR COMPANY

Tulsa Okla.

NEW YORK OFFICE:
Export Representative:
Oil Field Equipment Co.,
30 Church St., New York
Cable Address:
"Oilfields," New York

CALIFORNIA OFFICE:
2039 E. 38th St.,
Los Angeles, Calif.

LOUISIANA OFFICE:
405 Forest Ave.
Shreveport, La.

LONDON OFFICE:
Perkins MacIntosh Petroleum Tool & Boring Co., Ltd.
25 Bishopsgate
Cable Address:
"Oleborers," London

TEXAS OFFICES:
924 Post Dispatch Bldg.
Houston, Texas
1402 Ft. Worth Natl. Bank Bldg.
Fort Worth, Texas

We Will Enjoy Meeting You

at Our Booths 102 and 109 Texas Building

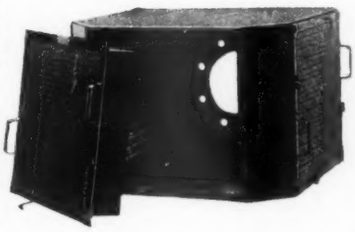
The Oil Field Equipment Shown Here Will Be Displayed

—Your Inspection Is Invited

Reed Air Filters

Reed Air Filters have proven their ability to take out practically all of the dirt and abrasives with which ordinary air is charged and to deliver only clean air to the engine or compressor.

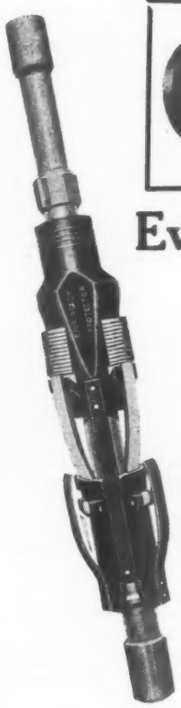
This clean air . . . REED AIR . . . means longer life and less upkeep cost on compressors and engines. Leading operators in the Oil and Gas Industry have adopted Reed Air Filters as standard equipment —which is the result of exhaustive tests under extreme operating conditions.



Perfection Pump Piston

The Perfection Non-Pulsating Pump Piston is another winner. It's built for the tough pumping problems where the ordinary piston simply will not deliver the goods. It has won friends wherever tried out and users are constantly coming back for more of them to complete their standardization.

Ever-Ready Protector



It is a positive protection against dropped tubing, is adjustable up or down in the hole as needed, and its sturdy construction guarantees its long life under the most difficult usage.

The tubing may be raised or lowered at will and the Protector's position in the casing may be changed, up or down, by a simple operation at the casing head. There's a special bulletin covering the Ever-Ready Protector. May we send you a copy? And don't forget to see it demonstrated at the Exposition.

Victaulic Couplings

Here's a simple, fool proof, leaktight flexible pipe coupling that is winning favor wherever shown. Without special tools and with ordinary labor you can lay a leaktight line faster with Victaulics than with any other type of coupling known.

The coupling, once applied, is there to stay. It will stand extreme deflection tests without showing sign of a leak and will wear as long as the pipe itself.

Waters Gauge

The Waters Gauge Cock is an old favorite with the boiler tenders in every oil field in the country. Its simple, sturdy construction, the Monel Metal, non-corrosive nozzle and the reversible gasket with twice the usual number of seats, all have made it the most popular gauge on the market.

It is stocked by all leading supply stores and is used by knowing boiler tenders the world over.

Fisher Equipment

Fisher Dependable Specialties are known in every branch of the industry for their high quality and ability to consistently perform the task for which they are designed.

A corps of engineers specializing in the work of regulating liquids and gases are solving new problems at the Fisher Plant every day. If you have one that is troublesome, you can put it in their hands with confidence that they will ultimately deliver a device to cope with it.

SMITH SEPARATOR COMPANY

Tulsa Okla.

NEW YORK OFFICE:
Export Representative:
Oil Field Equipment Co.,
30 Church St., New York
Cable Address:
"Oilfields," New York

CALIFORNIA OFFICE:
2039 E. 38th St.,
Los Angeles, Calif.

LOUISIANA OFFICE:
405 Forest Ave.
Shreveport, La.

LONDON OFFICE:
Perkins MacIntosh Petroleum Tool & Boring Co., Ltd.
25 Bishopsgate

Cable Address:
"Oleborers," London

TEXAS OFFICES:
924 Post Dispatch Bldg.
Houston, Texas
1402 Ft. Worth Natl. Bank Bldg.
Fort Worth, Texas

with those known not to give good service, it was demonstrated that the elongation characteristics of good belts fell within a well defined range of variation. Typical curves are the basis of the specifications.

Fatigue Tests on Belting

The whole purpose of the A. P. I. Committee is to develop standards for belts that will give best service under actual conditions rather than under test conditions alone. It is impossible, of course, to purchase a belt on the basis of its own actual performance, because not until the life of a belt is consumed, do we have any data on its ability to withstand the destructive forces of continuous field operation.

Tests give us a definite idea of particular characteristics contained within a new belt. By preserving records of tests on belts, which have been tested when new and gave certain results, but which have since been put into service and worn out, we have a basis for predicting the performance of the new belt. We need only to compare the new tests then with those made on belts whose performance we already know. If, then, by tests we are able to correlate predetermined characteristics with field performance, we have gone a long way toward knowing beforehand what to expect of our purchases. We must not expect that a new purchase will give us "field condition service" commensurate with "laboratory condition service" when basing our considerations only on a few test characteristics of the belt.

If we were to purchase a lot of belting and selected a few samples from the lot and installed these on actual equipment, after the sample belts had operated until worn out, we would know as to whether we might expect good service from the entire lot of belting. Such a procedure is inconceivable.

However, if we devise some plan whereby we might select our samples from the lot and by means of an "accelerated service" test lasting only a few days, could predict field performance characteristics, we get our test down to a usable basis. Such was the reasoning of the Belting Committee in deciding to develop a "fatigue test," a test which might be an index of field service, yet determinable quickly, simply, and cheaply.

"Fatigue" was the name given the test because the amount of constant changing of stresses in the belt which finally fatigue it and cause its failure was to be determined. No test can be designed which will take into account careless handling, poor equipment installation, and lack of attention in the field.

The first machine designed for this work was a walking-beam device whereby a given load was continuously dropped from a certain height at a given speed onto a horizontally supported section of belting maintained at a constant tension. The results obtained were only partially satisfactory under the original scheme.

F. O. Prior of the Midwest Refining Co. next attempted to work out a plan for checking the fatigue-resisting capacity of belts. His apparatus and method of procedure together with his conclusions are presented herewith.

"Object: To determine the point of fatigue of belts such as are commonly used in oil field practice.

"Definition: Fatigue as used in this test is considered to mean any type of belt failure that is caused by running the belt.

"Principles: It was decided to make a time-tension study of belts on some apparatus wherein the tension could be measured and the conditions of loading and running made variable. It was decided that in order to decrease the time necessary to fatigue a belt that the belt should be subjected to a series of shocks rather than a constant tension.

"With these principles in mind the testing apparatus described below was designed.

"Apparatus: The testing apparatus consisted of two Dodge roller bearing, sliding base countershafts equipped with suitable pulleys and mounted so that the belt under test would be driven by one countershaft and drive the other. We will call the driving countershaft No. 1 and the driven shaft No. 2.

"No. 1 shaft was equipped with a 40-inch diameter pulley on one side and a 13⅞-inch diameter eccentric pulley on the other. Power being furnished by a 15/35 horsepower variable speed Westinghouse oil field motor.

"No. 2 shaft was equipped with a 40-inch diameter pulley and a 15-inch diameter pulley. The power to drive this shaft was supplied through the test belt running between the 13⅞-inch diameter, eccentric pulley on No. 1 shaft and the 15-inch diameter pulley on No. 2 shaft. Load was supplied for No. 2 shaft by a belt drive off the 40-inch pulley to a 15/35 horsepower variable speed Westinghouse oil field motor. By driving this motor counter to its electrical field it became an electrical brake and any desired load could be put on the belt.

"An idler pulley was suspended midway between the two countershafts on the driving side of the test belt. This idler pulley was so arranged by means of suspension belts that it had 15 inches of vertical adjustment which could be used to tighten or slacken the test belt and it was also arranged so that it could be suspended from a tension dynamometer, at any time, in order to measure the downpull of the running belt and thus calculate its tension. The sketch and pictures show this arrangement. Further adjustment of the test belt tension was possible by sliding the two countershafts, each shaft having 25 inches of adjustment in its sliding base. Running tension was also variable, of course, by changing the load on No. 2 shaft.

"The eccentric pulley on shaft No. 1 was an ordinary pressed steel pulley rim into which a hub has been welded 2 inches off of the rim center. This was designed to give the belt the desired tension shocks and also to resemble the action of an unbalanced crank on a pumping or drilling well belt although its effect on the belt would be much more severe than the action of an unbalanced crank, as the distance from outside point to outside point on the rims of the two pulleys over which the test belt ran actually changed 4 inches during each revolution of the shaft which would be equivalent to an 8-inch change in the length of the belt.

"Methods of Testing: Test belts were placed on the pulleys and run under various conditions of tension, load, speed and slip. Dynamometer readings were taken at half hour intervals as were speed readings on both driving and driven countershafts. In reading the dynamometer only maximum readings were taken and recorded as it was found that with a belt running over the eccentric pulley the oscillation of the dynamometer indicater hand were so rapid that only a maximum could be read. Extreme accuracy of even maximum readings was impossible. Shaft speed readings were taken to compute the slip of the belt as a basis for determining its effect on the belt.

"Results: The results obtained from these tests can only be considered as preliminary work to more exhaustive fatigue testing as not enough belts have been tested to enable us to attempt any fatigue specification. The following facts stand out as the result of these tests:

"First: All breaks obtained were at the belt splice. This holds true for both factory endless belts and belts joined with clamps, showing that the joint is the weakest part of the belt.

"Second: There is considerable difference between the strength of factory splices on different belts of the same manufacture.

"Third: Excluding the joint breaks, belts used in these tests were not appreciably damaged even though the type of drive would be classed as severe abuse. The only visible effect on the belts was the wearing off of the friction surface on the pulley side due to slippage.

"Conclusions and Observations: First: That it is readily seen from inspection of the above results and summary that we have established no consistent mathematical relation between time of fatigue and tension or slippage, although they clearly show that excessive tensions greatly reduce the time of running.

"Second: That due to the length of time required to fatigue belts a long period of experiment is necessary before fatigue specifications can be arrived at.

"Third: That fatigue specifications should be divided into two parts—joint or splice specifications and belt material specifications.

"Fourth: That oil field belts do not fail because of the severity of the actual work required but rather because of abuse—both avoidable and unavoidable.

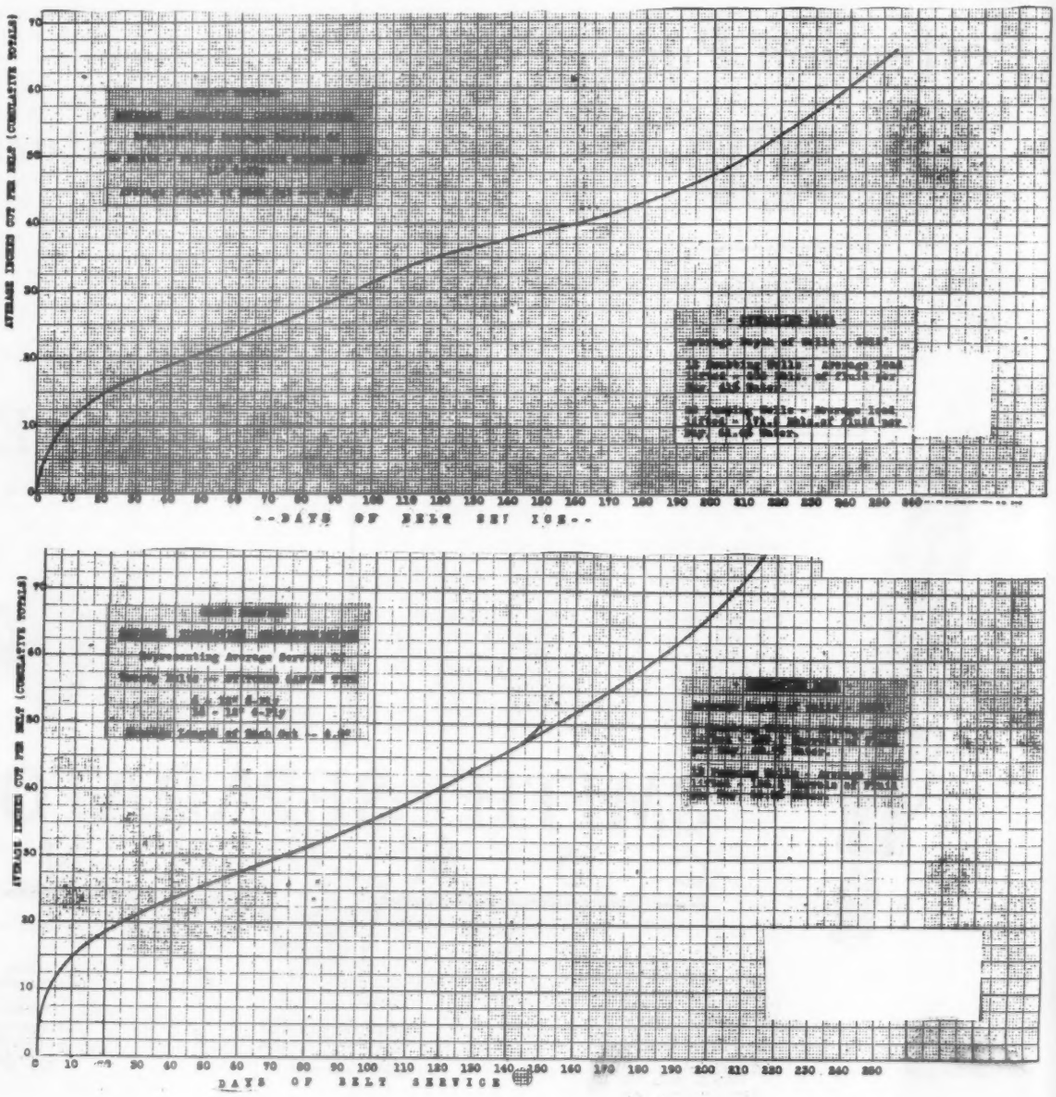
"Fifth: That a method of testing must be devised where conditions can be kept constant and can be accurately duplicated.

"Sixth: That the method used in this test does not meet the requirements for a fatigue test."

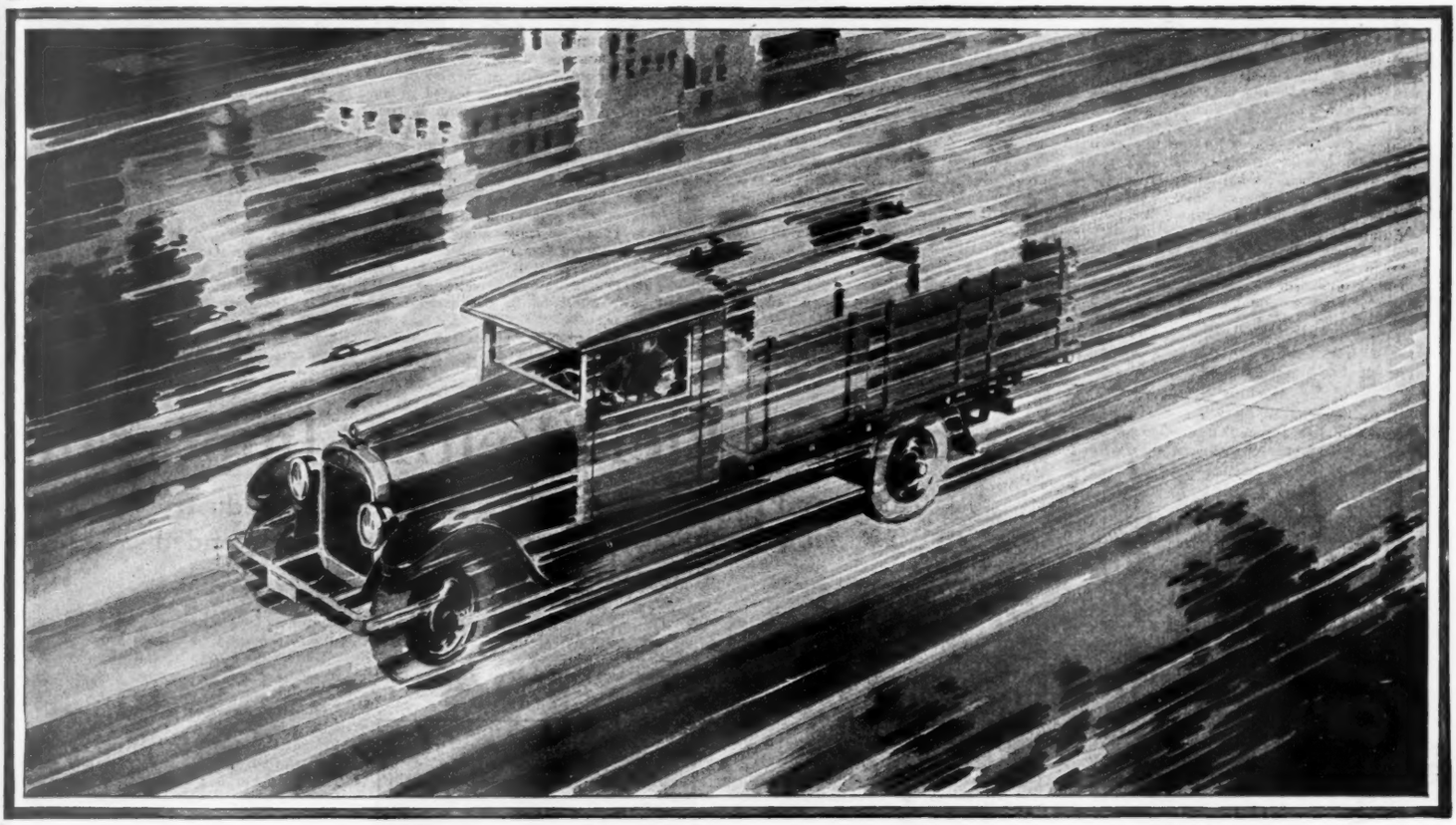
Belt Stretch Under Actual Conditions

One Mid-Continent company has conducted an investigation of its field operation of belting to determine the rate at

(Continued on Page 380)



The Third of the New Speed Wagons



The Master Speed Wagon

EVEN huskier than the Standard Speed Wagon—for hauling loads up to two tons. The announcement of this Master Speed Wagon, the third of the new Speed Wagons, marks the widening of the Speed Wagons' field of usefulness, the opportunity to put Speed Wagon utility and Speed Wagon economy to work on a greater number of hauling jobs.

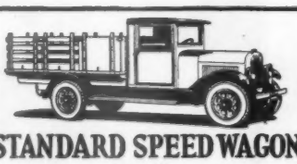
6 Cyl. Speed Wagon Engine Coupe Cab-4 Wheel Brakes

NEW lowness—*NEW* comfort—*NEW* power—*NEW* acceleration—*NEW* speed—*NEW* ease of handling—*NEW* completeness—*NEW* chassis lubrication with Myers Magazine Oilers—*PLUS* even more of the rugged durability that has saved thousands of dollars for former Speed Wagon owners

REO MOTOR CAR COMPANY, *Lansing, Mich.*

also

SPEED WAGON JUNIOR
"A Chip of the Old Block"



STANDARD SPEED WAGON
for the World's Average Load

MASTER SPEED WAGON
for Loads up to Two Tons

SPEED WAGON

for faster, surer, easier, cheaper hauling

©

A.P.I. Specifications for Belting

These specifications were prepared by the Special A.P.I. Committee on the standardization of belting for oil country purposes. Specifications on leather, stitched cotton fabric, balata and rubber belting were amended and adopted as final in June, 1927; specifications on solid woven hair and solid woven cotton belting remain tentative. It is urged that these specifications be used in the purchase of belting and that adequate service records be maintained on such belting, in order that additional information may be obtained which can be utilized in the revision or refinement of final specifications and in the formulation of final specifications on those that are still tentative.

Funds have been appropriated for research work on the fatigue tests and type of belt fasteners, still incomplete.

Marking

Authority cannot be granted a manufacturer to use the A.P.I. monogram on belting manufactured in accordance with

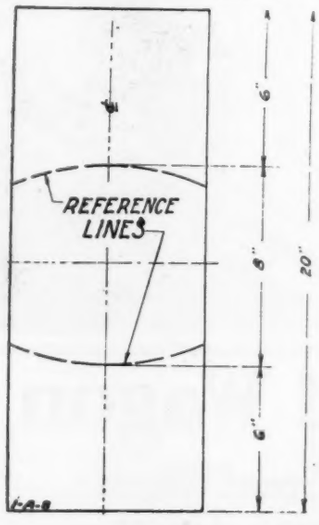


Figure 1.
Measurement for elongation by dividers on center lines of specimen.

these specifications. The method of using the A.P.I. monogram on products manufactured in accordance with the final specifications contained herein is still to be determined. Manufacturers are authorized, however, to refer to these specifications on belting made in accordance therewith.

Section A—Material Covered

A-1. These specifications apply to belting designed for oil country use.

A-2. The following types of belting are described:

Leather belting (final).
Impregnated stitched cotton fabric belting (final).
Solid woven hair belting (tentative).
Solid woven cotton belting (tentative).
Balata belting (final).
Rubber belting (final).

Section B—A.P.I. Final Specifications for Leather Belting

B-1. Belting of this class shall consist of first quality oak tanned leather or equal, free from undesirable defects of material and workmanship; it shall be uniform in character and unadulterated with injurious compounds of any kind, and shall be suitable for general oil field usage.

B-2. No belting strips shall be longer than 54 inches or less than 36 inches, including the lap, except in double belts where one-eighth of the strips may be between 20 inches and 36 inches long, if none are inserted adjacent to each other. All laps shall be at right angles to the edge of the belt and shall not be shorter than 3 inches. No laps in double belting may be closer than 8 inches, all laps running in the same direction throughout the belt.

B-3. All belts shall be purchased on the basis of lineal feet for different widths in single, double, or triple thicknesses without regard to weight.

Physical Tests

B-4. Tests shall be made in an atmospheric temperature of 70 to 85 degrees Fahrenheit. The samples shall be kept at a temperature between these limits at least four hours previous to the time of tests, relative degree of humidity 65 per cent.

Sampling

B-5. Samples the full width and thickness of the belt shall be taken of each lot of belting.

Initial Elongation Test

B-6-a. Test specimen 20 inches in length shall have transverse reference lines marked upon it 8 inches apart and at equal distances from the ends, as shown in Figure 1.

B-6-b. Specimen shall be tested in an approved type of vertical tension testing machine. The rate of the separation of the jaws shall be between one-half inch and 1 inch per minute. The test machine shall be equipped with wedge-shaped jaws. The base of the jaws shall be at right angles with the longitudinal center of the belt; all surfaces shall be true; the back and edge surfaces shall be properly cleaned and well lubricated; the base surfaces of the two edges of each set of jaws shall be in the same horizontal plane.

B-6-c. The elongation shall be taken at the pounds tension shown in Table 1 by means of dividers and the measurement made on a true scale with inches graduated in tenths, the per cent of elongation to be within limits shown in Table 1.

TABLE 1
Initial Elongation: Leather Belting

Pounds Tension per Inch of Width	Per Cent Elongation Maximum	Minimum
200	5	3
400	10	5.5
600	14	7.5
800	18	9
1,000	20.5	10
1,200	23	10.5

B-6-d. The trend of the initial elongation curve shall be uniform and conform to the graph, Figure 2.

Ultimate Tensile Strength

B-7. The elongation test described above shall continue to the breaking point

(Continued on Page 183)

Care of Oil Field Belting Important

Abuse and Inefficient Operation Costs the Oil Industry Vast Sums Each Year. Proper Methods Recommended

By David L. Trax
Gypsy Oil Co.

The proper care and use of belting includes vastly more than careful selection and manual handling of the belting itself. It involves also the design, installation, adjustment and regular inspection of both driving and driven equipment, also, many other things in the way of organization and vestment of responsibility and authority.

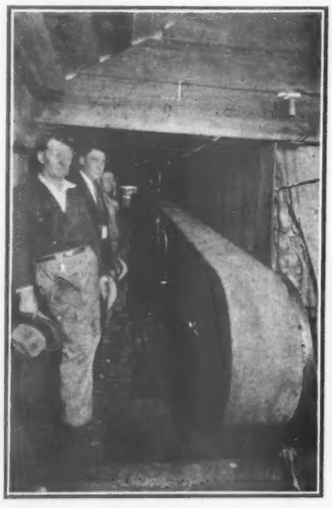
On account of the transitory nature of oil field work the installations cannot be as carefully put in as in a factory where they are installed with more permanence; consequently there are many installations in the oil fields where the band wheels and driving pulleys are out of alignment and belts either run several inches off the pulleys or are kept on by

DAVID L. TRAX

a piece of wood or iron against which the edges of belt run, causing fraying. Frequently band wheels and pulleys are in poor condition which, of course, is injurious to the belt.

Most belts are put on in the oil fields by men who are not mechanics and wrong methods are often adopted, such as nailing the belts on the band wheel and starting the engines. This is very apt not only to tear the belt but if the belt is cut too short, it will rupture the fabric where the belt goes over the edge of the wheel.

The oil field belt fastener is not the best type of fastener for any type of belt because it bends the belt up at right angles and is so heavy that it causes a whipping motion of the belt with the prevalent uneven loads. In many cases the



Showing belt running off pulley, due to misalignment, and frayed edge of belt, due to dragging on mud sill

bolts of the fasteners are not properly tightened, with the result that the tension of the belt pulls directly against the bolts instead of a frictional grip over complete width of fastener and eventually belt will pull out of fastener. Also, in punching holes for fastener they are not lined up with a square so that an uneven joint is made, causing undue strain on one edge of belt.

In handling belts in the oil fields, it should be borne in mind that at all times they should be well protected from the elements, snow, wind, rain and dust.

To summarize briefly the principal abuses, to which belting is subjected in the oil fields, are as follows:

Belt too loose, allowing it to slip one way or the other, or too tight, causing undue strain in belt.

Pulleys out of alignment, allowing one edge of belt to overhang, causing all the strain on the other edge.

Too light a belt used for the work required.

Improper joining of ends, ends of belt not cut at right angles to edge and bolt holes not in alignment with square end, causing ends to be joined crooked.

Bolts in fasteners not tightened up properly.

Wrong method of putting on belts.

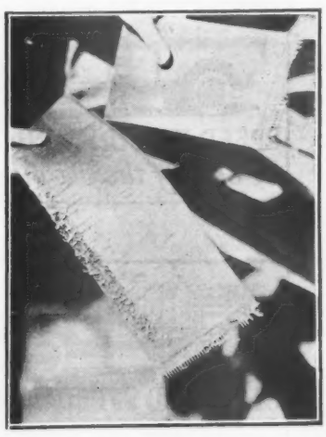
Oil from bearings dropping on edge of belt, causing that edge to stretch and deterioration of belt as a whole.

Too much sticky or gummy belt dressing applied and piling up on pulleys or belt, causing irregular surface, resulting in increased slippage and ply separation.

Belt houses in poor condition, giving no protection to belt against weather conditions.

Recommendations Offered

As a correction for the principal abuses of belting in the oil industry I wish to offer the following recommendations:



Effect of pulleys being pulled out of alignment

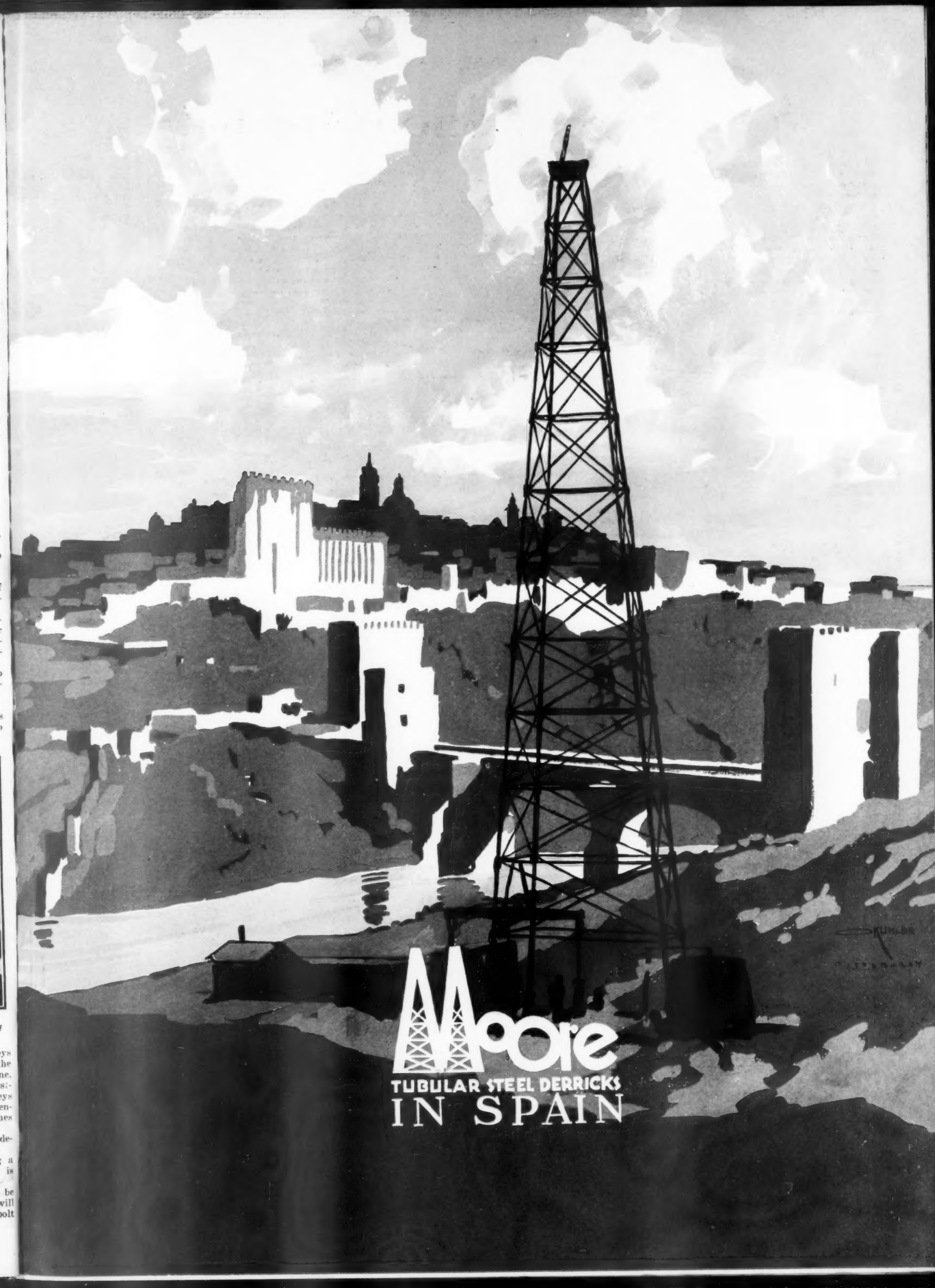
Install equipment so that all pulleys will be centered and balanced and the shafts carrying them perfectly in line, parallel and in the same plane. Adjustments should be made to keep pulleys in alignment so that belt will run in center. Pulleys should be at least 2 inches wider than belt they are to carry.

The proper size belt should be determined for each individual job.

All belts should be installed, using a belt stretcher and thereafter when it is necessary to cut same.

In joining the ends, the belt should be cut, using a square so that the end will be at right angles to the edge and bolt

(Continued on Page 392)


Moore
TUBULAR STEEL DERRICKS
IN SPAIN

In SPAIN

Wherever oil has been sought in this beautiful land of sunshine and romance, Moore Tubular Steel Derricks have been called upon for help. Their ease of erection and dismantling, their portability and economy make them ideal for use in undeveloped territory.

The adaptability of the Moore derrick, its ability to meet widely varying conditions, has made it a favorite in oil countries all over the world.

Moore
TUBULAR STEEL DERRICKS

LEE C. MOORE & COMPANY, INC. PITTSBURGH · TULSA

Established 1907

Dallas, Texas · Houston, Texas · Wichita Falls, Texas · Borger, Texas · Parkersburg, W.Va.
Casper, Wyo. · Shreveport, La. · El Dorado, Kan. · El Dorado, Ark.

Inception, Progress and Consummation

Of Standardization of Rig Irons Described by National Chairman of Committee

By H. J. Lockhart
National Chairman of the Special Committee on the Standardization of Rig Irons

"Firms making consistent effort to eliminate waste through simplification and standardization to improve both products and processes—thus to give better value for the same or for less money—are strengthening the consumers power to buy."

This thought, for which credit must be given to R. N. Hudson, chief of the Division of Simplified Practice, is really the unselfish basis of all standardization movements and outlines, though briefly, the mutual benefits to be derived.

The elimination of waste by simplification and standardization permits the purchaser of manufactured products not only to get more for his dollar, but to have more dollars for future purchases.

H. J. LOCKHART

Surely, this is a condition much to be desired.

Surely, the absence of this condition, its neglect, or any expressed, implied, or evident indifference to it, is nothing short of a breach of trust. Any man selling to others is in a position of trust. It is his obligation to give full value. This is true of the man who sells his services and true as well of the corporation or individual which sells the complicated product of a factory or of a highly complicated system of factories. Waste and extravagance are breaches of trust.

As a natural sequence, standardization came to the oil-producing industry, as it has and is coming to all industries, that is, in rapidity and volume proportionate to growth.

Engineers of national and international reputation startled the commercial world with the statement that lack of simplified practice in industry was costing $10,000,000,000 annually.

Beginning of Study

Executives of our greatest industries began to inquire what could and should be done. Similar industries were grouped for conferences both among themselves and with consumers of the manufactured products. Plans were formulated and with consistent and continuous effort carried to conclusion. The benefit was immediately apparent and the movement was popularized, magnified and extended. The Chamber of Commerce of the United States took it up and helped. Trade organizations helped with brains and money. Engineers, machinery manufacturers, marketers, producers, executives, factory managers and employes, all co-operated for a popular movement—standardization or simplification—for the elimination of waste.

It is, then, a matter of little remark that this popular movement, shortly after its inception, attracted the rank and file of one of our greatest industries—the oil industry—ever alert for ways and means of progress—and as witnessed by its prosperity—ever successful in the adoption and use of all ways and means available.

Back in 1922, the question was asked in St. Louis at the third annual meeting of the American Petroleum Institute, "What has been done toward uniformity of oil drilling methods and equipment?" It developed that something had been already accomplished by the Purchasing Agents Association of Tulsa. The buyers, representing the purchasing power of a great industry, were interested. What could be done to interest the manufacturers catering to the industry? What more could be desired than the endorsement of those individuals responsible for the success and standing of the industry grouped together and known as the American Petroleum Institute? This endorsement was given in a resolution passed by the institute on the standardization of oil field equipment, and the movement was on foot.

L. J. KING
Rig Irons.

Chairmen were appointed for committees of manufacturers, which committee would serve voluntarily. The chairman to report results to the directors of the institute and the recommendations made to be finally approved by it.

The Rig Iron Standardization Voluntary Committee was quick to arrange for work. On the call of its chairman, all rig iron manufacturers were invited to participate through the appointment of representatives for permanent service. As the movement grew, the plan of organization expanded, manufacturers' committees grew into a combination of committees of manufacturers, engineers and producers, until the organization today is widespread, well chosen and well organized as follows:

The national chairman, vice chairman and secretary.

Eastern, Mid-Continent, Texas, Louisiana and Arkansas, California and Rocky Mountain subcommittees composed of representatives of manufacturers and producers.

Manufacturers' subcommittee composed of manufacturers' representatives.

Interchange of Ideas

Interchange of ideas between these committees and between the individual members, group meetings and meetings in connection with the annual gathering of the American Petroleum Institute, have been frequent and productive. Harmony has been maintained in the face of debate and constructive comment. The services of engineers and executives have been gladly offered and given. The American Petroleum Institute, through its division of standardization, has fostered, aided and given every possible background to the plan, which, with this united effort, we feel is an accomplished and unqualified success with the final and hearty endorsement of that great body of men, the American Petroleum Institute.

Licensed by the American Petroleum Institute in accordance with standards adopted, nine domestic and two foreign manufacturers are authorized to make and distribute standardized rig irons—the result of over five years of consistent, continuous and well-considered effort, on the part of leaders in the industry.

We must not, in connection with the success of the movement, fail to give due credit also to the trade associations for their co-operation and material assistance, as well as for their moral support. The various associations of purchasing agents, the Natural Gas Association of America, as well as numerous other oil and gas associations, and other bodies of men interested in and affiliated with the oil-producing industry and with the manufacturers catering thereto, contributed materially.

J. S. FREEMAN
Rig Irons.

What has the movement cost?

Thousands of dollars invested by the American Petroleum Institute in the organization and carrying on of its division of standardization, in time of its members and officers, in conveyance and maintenance charges. Thousands of dollars invested by the producing companies for the same purposes as applied to committee members and others interested in the movement. Thousands of dollars invested by the manufacturers of rig irons along the same lines for preliminary work in committee and for drawings and blueprints, correspondence and telegrams, and various items too numerous to mention but none the less expensive.

Cost of Making Change

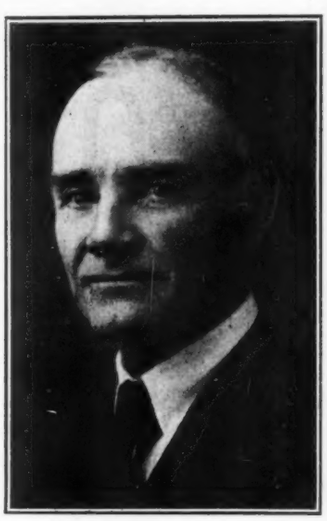
And last, but not least, the change from the many styles, sizes and dimensions of rig irons to the styles, sizes and dimensions agreed upon and sanctioned by the institute. This burden, if it can be so called, although willingly undertaken, is probably the heaviest to be borne. The company, of which the author of this article is vice president and general manager, has alone invested $100,000 in accomplishing the change. This includes engineering work, patterns, machine tools and equipment, experimental work, catalog compilation and advertising to the trade. Eleven companies are licensed to manufacture American Petroleum Institute irons and it is reasonable to believe that the cost to all manufacturers to make the change, when all have finally changed in accord with the movement, will be well over the million-dollar mark.

How does the benefit reflect?

Is the distribution of it equitable?

The standardization committee has in its possession statistics showing that from 1869 to 1926 there was approximately $350,000,000 expended for the purchase of rig irons and rig iron outfits. In the early days the irons were light and did not represent much money, and yet at the same percentage of saving that can be accomplished today by the use and adoption of standardized irons, they could have saved $35,000,000 had the early operators had the vision to foresee and inaugurate what has now been accomplished. Information gathered from the larger operating companies and segregated and compiled by those in charge of standardization shows that an approximate total of 12 per cent can be saved by the use of standardized irons. This divided as follows:

Eight per cent to the rig iron consumer; 2 per cent to the rig iron manufacturer, and 2 per cent to the steel manufacturer.



JOHN J. DURST
Rig Irons.

Based on the wells drilled in 1925 on which rig irons were used, we find that by this method a saving of $1,500,000 is made for the industry on this item of drilling equipment alone.

At the sixth annual meeting of the American Petroleum Institute in January of last year at Los Angeles, Capt. J. F. Lucey, in commenting on the report sub-

BAKER

BAKER
CEMENT BASKET

A highly developed appliance providing a safe and sure means for cementing off around a string of casing. Saves an extra string of casing without reducing size of hole. Has a gas-outlet valve which permits any gas to escape which might otherwise keep the cement from setting. Where safety and perfect cementing is desired operators find the Baker Cement Basket the most dependable.

BAKER SURE SHOT
CEMENT PLUG

Forces all of the cement out of the casing when landed, when the cement is put in with a dump bailer. Has special valve construction to relieve fluid pressure which permits lowering as fast as bailer will go down. Made in all sizes from 4½" to 15½".

BAKER CEMENT
DUMP BAILER

All unnecessary parts have been eliminated in this Baker Bailer. No latches, springs, chains or plungers to retard proper functioning or invite delays or expensive upkeep. The dumping process is by a sliding sleeve with lock and trip feature. This is not found in any other bailer. Never fails to dump at proper time and can be run as often as necessary to deposit necessary amount of cement, all parts contained in sleeve insuring smooth, positive action.

Cementing Tools

Dependable and Efficient

A high place has been won for Baker Cementing Tools in the oil industry by their satisfactory performance under all conditions of service.

Many operators in all fields are placing their dependence on these Baker tools. Experience has demonstrated their ability to do the work quickly and with a high factor of safety, economy and accuracy.

The name "Baker" on a cementing tool, or on any oil field specialty, is your guarantee of dependability and highest efficiency. It is your assurance of the maximum of service for the purpose intended.

You can get complete details of the three products illustrated and of the complete Baker line by sending now for latest catalog. You owe it to yourself and to your firm to know the merits of the Baker tools.

BAKER CASING SHOE COMPANY

Box L, Huntington Park, Calif.

Coalinga, Calif. **Taft, Calif.**

Export Sales Office:
25 Broadway, New York City

Mid-Continent Representatives:
B & A SPECIALTY COMPANY
220 E. Brady St., Tulsa, Okla.
708 Keystone Bldg., Houston, Texas

BASCO

Visit Our Booth (No. 113) at the Fourth International Petroleum Exposition, Tulsa, Sept. 24th to October 1st, 1927

mitted by the chairman of the Rig Iron Committee, spoke in part as follows:

"The second comment I want to make and I think I am qualified because I have made an exhaustive investigation of standardization, is that the saving of 12 per cent is 50 per cent too low. Since he made that report to the General Committee on Standardization yesterday, I have been checking it up with competent engineers and practical men and they are in accord that his estimate should be nearer 25 per cent than 12 per cent. Mr. Lockhart made the statement that he had cut down the estimate 50 per cent."

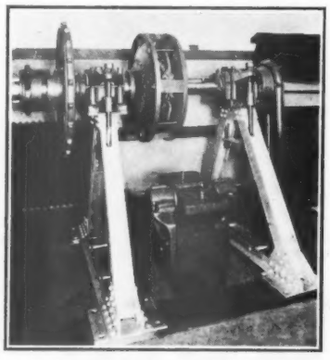
At this rate the saving to the user would be approximately 17 per cent.

Right here let us say "order standardized rig irons."

Accomplishing Results

Purchasing agents, engineers, executives and employes of producing companies, all wanted standardized rig irons. They all worked in co-operation with manufacturers to make standardized irons available. They all spent or invested good money with the manufacturer to secure the desired results. The program, while it will be continued and elaborated upon, is practically completed and has been subscribed to by the sponsor for the oil industry—the American Petroleum Institute. The savings to be taken advantage of are well worth while and immediately available. Every set of A. P. I. irons purchased is an additional investment to be added to the huge sum already well spent in starting and consummating standardization of rig irons.

The author of this article has been definitely asked whether the accomplishment



Standardized irons.

of standardization is bringing about the hoped-for and anticipated results.

The answer is yet—slowly but surely.

It can be speeded up by the continued co-operation of all those who co-operated so fully and heartily to bring it about.

Standardized irons are on the market. Standardized irons are being used. Standardized irons are on exhibition at the permanent exhibit maintained in Tulsa by the Tulsa Purchasing Agents Association. There is at least one catalog in the hands of the industry descriptive of standardized irons. While the chairman of the special committee on the Standardization of Rig Irons is not acquainted intimately with the extent to which standardized irons are being manufactured, he does know that the corporation with which he is affiliated has, under his direction, produced and marketed many sets which are in successful and economical use, and it is reasonable to suppose that other manufacturers are in line or getting in line as rapidly as may be possible.

Look on this movement from an investment standpoint. Buy standardized irons as you would buy gilt edge bonds or life insurance. The benefits may not be immediate, but they are real and you can cash in later on.

Benefits of Standardization

What will you get with standardized irons, you may ask.

The economical and industrial significance of any standardized product is not generally known and appreciated, but it is none the less valid and far reaching.

It enables buyer and seller to speak the same language and makes it possible to compel competitive sellers to do likewise.

Better quality of product through ability of manufacturer to concentrate on better design and through the reduction of manufacturing expense.

It lowers unit cost to the public by making mass production possible, as has been strikingly shown in the unification of automobile parts.

By simplifying the carrying of stocks, it makes deliveries quicker and prices lower.

It decreases litigation and other factors tending to demoralize industry, the burden of which ultimately falls upon the public.

It eliminates indecision both in production and utilization, a prolific cause of inefficiency and waste.

It stabilizes production and employment by broadening the possible market and by making it safe for the manufacturer to accumulate stock during periods of slack business to an extent which would not be safe with an unstandardized product.

By focusing on essentials, it decreases selling expense, one of the serious problems of our economic system.

By concentrating on fewer lines, it enables more thought and energy to be put into designs so that they will be more efficient and economical.

As outlined previously, all the benefits to be derived from the standardization of rig irons should accrue to those who made standardization possible, although these benefits are in varying degrees. Let us not then desert the work of our own hands by neglecting to accept standardization as an accomplished fact — as an opportunity open to us all for profitable investment.

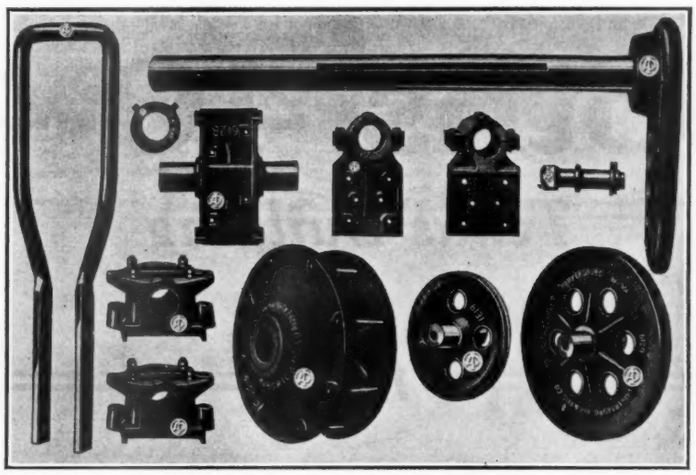
Buy standardized rig irons.

Use them in accord with the code on proper use and care of rig irons in the field.

This code was made a part of the proceedings of the special A. P. I. committee on the Standardization of Rig Irons at Colorado Springs in June of this year, and will be available on application to C. A. Young, director, Division of Standardization, American Petroleum Institute, 1508 Kirby Building, Dallas, Tex.

It covers purchasing, inspecting, shipping, lubricating and general use, and should prove both interesting and instructive, especially to the uninitiated or to those who have not closely followed the standardization of rig irons.

It may safely be used as a guide for the factors mentioned above and makes the way plain for successful utilization by those most interested of all that has been accomplished both by and for them.



Miscellaneous standardized irons.

A. P. I. SPECIFICATIONS FOR STANDARDIZATION OF RIG IRONS

These specifications were prepared by the special A.P.I. committee on the Standardization of Rig Irons, appointed by the board of directors of the American Petroleum Institute.

In formulating these dimensional standards, the committee worked along the following lines:

First—Elimination: Three sizes of rig irons have been eliminated, viz., 4-inch, 4¾-inch (usually known in the oil fields as "standard" rig irons), and 5-inch Ideal or California type.

Three sizes of rig irons, 4½-inch and 5-inch (usually known in the oil fields as "standard" rig irons), and 6-inch Ideal or California type, as illustrated herein, have been adopted as standard, and in the future will be referred to as "A.P.I. standard."

Twenty-three different sizes of sand reels have been eliminated.

Five sizes of sand reels (as illustrated herein) have been adopted as standard.

Second—Uniformity of essential dimensions within certain limits or tolerances, as contained in this specification.

Wire line and derrick manufacturers were consulted, and the following standards were adopted as being the most practical within the limitations of present sizes of derricks.

The standard dimensions on chain, shafting and keys were agreed upon in conjunction with the special A.P.I. committee on the Standardization of Rotary Drilling Equipment.

The class of fits on all mating parts were selected from Report No. B-4A-1925, entitled "Tentative American Standards for Tolerances, Allowances and Gauges for Metal Fits," published by the American Society of Mechanical Engineers and approved by the American Engineering Standards committee, December, 1925.

The forms of groove in sheaves and pulleys specified herein are based upon the recommendation of the special A.P.I. committee on the Standardization of Wire Rope and Manila Cordage.

SECTION 1
Material Covered

1-a. These specifications apply to rig irons for oil country purposes. Three sizes, 4½-inch, 5-inch and 6-inch, are standard.

1-b. Specifications are given for the following items in each of the three standard sizes:

Cranks and shafts.
Wrist pins.
Band wheel flanges.
Band wheel flange keys.
Shaft set collars.
Jack-post boxes (front and back).
Saddles.
Side irons.
Gudgeons (bull wheel and calf wheel).
Pitman stirrups.
Crown pulleys.
Sand line sheaves.
Casing line pulleys.
Sand reels.

1-c. The following items have been standardized for the 6-inch size only:

Chalf wheel sprocket rim.
Calf wheel clutch sprocket.
Calf wheel clutch and key.
Calf wheel clutch strap.

1-d. The standards contained herein are dimensional only and apply to new material. This specification does not include chemical or physical properties of materials.

SECTION 2
Workmanship and Finish

2-a. All machined surfaces shall be finished in a good and workmanlike manner and shall be free from burrs, rough edges, etc.

2-b. All castings shall have rough edges chipped or ground off, shall be commercially clean, and shall be free from injurious defects. All cored bolt holes shall be drifted to insure free passage to proper sized bolts.

2-c. All forgings shall be free from injurious defects and shall have a workmanlike finish.

SECTION 3
Marking

3-a. Rig irons manufactured in accordance with these dimensional standards shall be stamped or marked with the official A.P.I. monogram as stipulated in these specifications. No rig iron material shall be stamped with the A.P.I. monogram that does not comply with these specifications. Authority will be granted to use the A.P.I. monogram in accordance with the rules and conditions contained in the appendix.

3-b. All rig iron material manufactured in accordance with these specifications shall also be marked with the manufacturer's name, or other identifying mark.

3-c. Where the A.P.I. monogram is specified on forged metal it shall be applied with a steel stencil, size of monogram to be one-half inch high.

3-d. When the A.P.I. monogram is specified on cast material the design of the monogram shall be affixed to the pattern, letters to be 1½ inches long, in a 2-inch circle; height of letters and circle to be not less than one-eighth inch.

SECTION 4
Chains and Sprockets
Size and Dimensions

4-a. Chain for use with A.P.I. standard rig irons shall be the A.P.I. standard. (See A.P.I. Stds. 7: "Transmission Standards"). New A.P.I. numbers, based upon the approximate pitch, have been recommended as follows:

4-b. Chain No. 1030 or ss-40, with pitch dimension of 3.075 inch shall be known as A.P.I. No. 3.

4-c. Chain No. 1135, with pitch dimension of 3.50 inch shall be known as A.P.I. No. 3½.

4-d. Chain No. 1240, or ss-124, with pitch dimension of 4.063 inch shall be known as A.P.I. No. 4.

4-e. Chain of the following dimensions are considered as standard:

A.P.I. No.	3	3½	4
Pitch	3.075"	3.50"	4.063"
Roller width	1-7/16"	1-7/16"	1-7/8"
Rolled diameter	1-1/4"	1-5/8"	1-3/4"

4-f. The sprocket tooth form used on A.P.I. standard rig irons shall be the A.P.I. standard. (See A.P.I. Stds. 7: "Transmission Standards").

SECTION 5
Shafts, Bores, Keys and Keyways

5-a. Shafts, bores in mating members, keys and keyways (except clutch keys and keyways for 6-inch crankshafts, shown in Figure 5), for A.P.I. rig iron crankshafts and sand reels manufactured

GIB HEAD TAPER KEYS

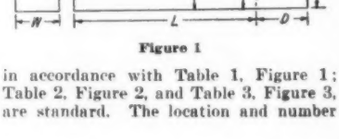


Figure 1

in accordance with Table 1, Figure 1; Table 2, Figure 2, and Table 3, Figure 3, are standard. The location and number

See

Booths 40-41

Texas Building

for

display of

Improved Products

manufactured

by

OKLAHOMA IRON WORKS

805 E. Archer Street **Tulsa, Okla.**

See

Booths 40-41

Texas Building

Exhibiting Improved products manufactured

by

OKLAHOMA IRON WORKS

for which we are a distributor

INTERNATIONAL SUPPLY CO.

TULSA INTERNATIONAL ISCo SUPPLY COMPANY OKLA.

of keys and keyways to be as specified in Section 6.

TABLE 1
Keys for A.P.I. Standard Rig Irons and Sand Reels
See Figure 1.
All dimensions in inches at 68 degrees Fahrenheit.

Nominal Shaft "T"		Nominal Key Size	Width "W"	Width Tol.	Height "H"*	Height Tol.	Taper Inches per Foot	Length "L"
4	Sand reel shaft	1x¾	1.000	+.000 −.003	.750	+.003 −.000	⅛	Opt.
4½	Crankshaft	1x¾	1.000	+.000 −.003	.750	+.003 −.000	⅛	Opt.
5	Sand reel shaft	1¼x⅞	1.250	+.000 −.003	.875	+.003 −.000	⅛	Opt.
5	Crankshaft	1¼x⅞	1.250	+.000 −.003	.875	+.003 −.000	⅛	Opt.
†6	Crankshaft	1¼x⅞	1.250	+.000 −.003	.875	+.003 −.000	⅛	Opt.
6	Sand reel shaft	1½x1	1.500	+.000 −.003	1.000	+.003 −.000	⅛	Opt.

*The height "H" is measured at the distance "W" from gib.
†The 6-inch crankshaft uses the same size key as the 5-inch, as shown.
Note—The dimensions indicated in Figure 1 and not shown in the above table are not essential to the fit; they can be obtained from A.P.I. Stds. 7: "Transmission Standards."

SHAFT DETAILS

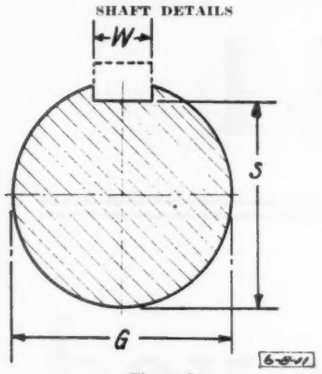


Figure 2

The numerical values of "R" and "S" are computed as follows:

R = (T + H/2 − .017) +.000 inch −.006 inch

S = (T − H/2 + .000 inch −.006 inch

Where

R = The diameter of the bore to the bottom of keyway in inches;

S = The diameter of shaft to the bottom of keyway, in inches;

T = Nominal diameter of shaft, in inches.

The reason for deducting .017 inch from the nominal depth of the keyway in the bored member is to establish the minimum projection of the key greater than "W".

A difference of .001 inch in "H" is equivalent to a movement of .096 inch measured parallel to the base of the key from "W".

W = The distance from the gib-head at which the values for "H" are computed.

X = Minimum projection of key with keyways ("R" minus "S") at maximum depth and height of key ("H") at minimum.

Z = Maximum projection of key with keyways ("R" minus "S") at minimum and height of key ("H") at maximum.

TABLE 2
SHAFT DETAILS
See Figure 2
All dimensions in inches at 68 degrees Fahrenheit.

	Shaft Diameter			Keyway				
	Nominal "T"	Actual "G"	Actual Tol.	Nominal Size of Key	Width "W"	Width Tol.	Diameter of Shaft to Bottom of Keyway "S"	Diameter of Shaft to Bottom of Keyway Tol.
Sand reel	4	3.995	+.000 −.003	1x¾	1.000	+.003 −.000	3.8250	+.000 −.006
Crankshaft	4½	4.495	+.000 −.003	1x¾	1.000	+.003 −.000	4.1250	+.000 −.006
Sand reel	5	4.995	+.000 −.003	1¼x⅞	1.250	+.003 −.000	4.5625	+.000 −.006
Crankshaft	5	4.995	+.000 −.003	1¼x⅞	1.250	+.003 −.000	4.5625	+.000 −.006
Crankshaft	6	5.995	+.000 −.003	1¼x⅞	1.250	+.003 −.000	5.5625	+.000 −.006
Sand reel	6	5.995	+.000 −.003	1½x1	1.500	+.003 −.000	5.5000	+.000 −.006

Note: All keyways shall be cut on a diametral center line.

BORED MEMBER

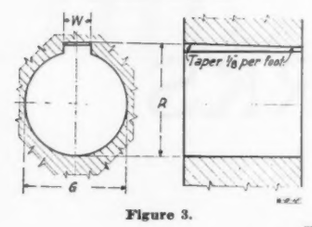


Figure 3.

TABLE 3
BORED MEMBER
See Figure 3.
All dimensions in inches at 68 degrees Fahrenheit.

	Diameter of Bore			Keyway				
	Nominal "T"	Actual "G"	Actual Tol.	Nominal Size of Key	Width "W"	Width Tol.	Diameter of Bore to Bottom of Keyway "R"	Diameter of Bore to Bottom of Keyway Tol.
Sand reel	4	4.000	+.0050 −.0000	1x¾	1.000	+.003 −.000	4.3580	+.006 −.000
Crankshaft	4½	4.500	+.0021 −.0000	1x¾	1.000	+.003 −.000	4.8580	+.006 −.000
Sand reel	5	5.000	+.0050 −.0000	1¼x⅞	1.250	+.003 −.000	5.4205	+.006 −.000
Crankshaft	5	5.000	+.0022 −.0000	1¼x⅞	1.250	+.003 −.000	5.4205	+.006 −.000
Crankshaft	6	6.000	+.0024 −.0000	1¼x⅞	1.250	+.003 −.000	6.4205	+.006 −.000
Sand reel	6	6.000	+.0050 −.0000	1½x1	1.500	+.003 −.000	6.4830	+.006 −.000

Note: All keyways shall be cut on a diametral center line.

5-B. PROJECTION OF TAPER KEY UNDER MAXIMUM AND MINIMUM TOLERANCES

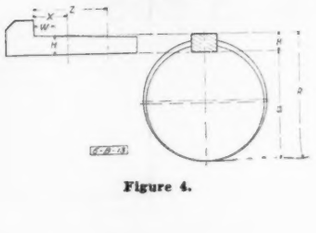


Figure 4.

Examples: Projections of 1 by ¾ inch key in 4-inch shaft.

Minimum projection "X"
"W" = 1 inch
"H" = .750 inch = .750 ins.
"R"—"S" = 4.364 inches
—3.619 inches = .745 ins.

Difference = .005 ins.

Whence (5) (0.096) = .480 inch, therefore projection "X" equals "W" plus .480 inch or 1.480 inches.

Maximum projection "Z".
W = 1 inch
H = 0.750 ins. + .003 ins. = .753 ins.
"R"—"S" = 4.358 inches
—3.625 inches = .733 ins.

Difference = .020 ins.

Whence (20) (.096) = 1.920 inches, therefore projection "Z" equals "W" plus 1.920 inches or 2.920 inches.

SECTION 6

Cranks, Shafts, Band Wheel Flanges and Wrist Pins

Cranks and Shafts

6-a. Cranks and shafts for A.P.I. standard rig irons shall be dimensioned as shown in Figure 5 and Table 4.

6-b. The crank and shaft shall be considered as one unit. They shall be so assembled that the crank is permanently attached to the shaft.

6-c. Each shaft shall be the same diameter, within the tolerance specified herein, throughout its length, disregarding that part of the shaft in the crank.

6-d. All shaft diameters, keys and keyways shall be as specified in Section 5, except clutch keyways at end of 6-inch crankshaft, which shall be as specified in Figure 5.

6-e. All flange keyways "P" shall be cut the full length of that part of the shaft between the front and back jackpost boxes; other keyways as shown.

6-f. Four and one-half and 5-inch shafts shall have one flange keyway.

6-g. The 6-inch shaft shall have two flange keyways, spaced 120 degrees apart.

6-h. One tug-pulley keyway shall be provided for the 5-inch shaft in the 6-foot 6-inch length.

6-i. The 6-inch shaft shall have two clutch keyways, spaced 180 degrees apart.

6-j. The crank and shaft for 4½-inch rig irons shall be made in one length of shaft only.

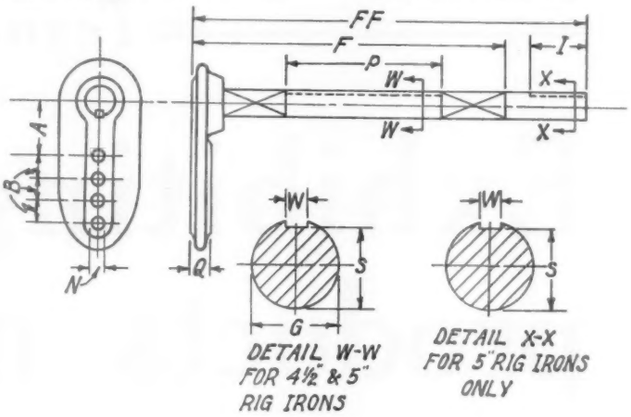
6-k. The crank and shaft for 5-inch rig irons may be made in two lengths of shafts, namely:

(a) Five-foot 6-inch length with keyways for flanges only.

(b) Six-foot 6-inch length with keyways for flanges and for calf wheel pulley.

6-l. The crank and shaft for 6-inch

(Continued on page 165)



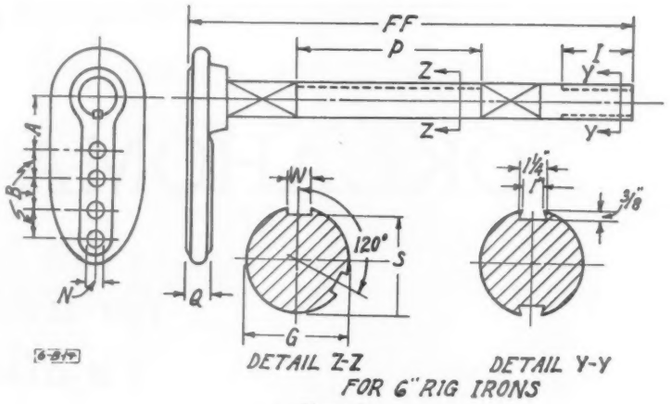


Figure 5
Cranks and Shafts

TABLE 4
Cranks and Shafts
All dimensions in inches at 68 degrees Fahrenheit, except length of shaft, which is given in feet.

	4½" Rig Irons		5" Rig Irons		6" Rig Irons	
	Dimension	Tolerance	Dimension	Tolerance	Dimension	Tolerance
Crank—						
"A" distance from center of shaft to first wrist-pin hole	11¼	....	11¼	....	12	....
"B" distance between wrist-pin holes	3¾	....	3¾	....	5	....
"N" diameter of wrist-pin hole	2.753	+.002 −.000	2.753	+.002 −.000	3.503	+.002 −.000
"Q" thickness of crank	3½	....	3½	....	4	....
Shaft—						
Length "F-F"	....	....	6'6"	....	7'6" and 8'0"	....
Length "F"	5'6"	....	5'6"	....	....	....
Keyways—						
No. of flange keyways required	1	....	1	....	2	....
"P" length flange keyways, (see paragraph 6-e)						
No. keyways required end of shaft	....	....	1	....	*2	....
Length "I"	....	....	9	....	12	....

Note: For shaft, key and keyway dimensions, see Section V. *The size of keyways for calf wheel clutch shall be as shown in Figure 5, detail "y-y."

No Wildcatting for Good Threads When You Use Landis

Landis cut threads are proven. They are of proper form, correct taper and of full length. They insure tight joints and eliminate expensive fishing jobs.

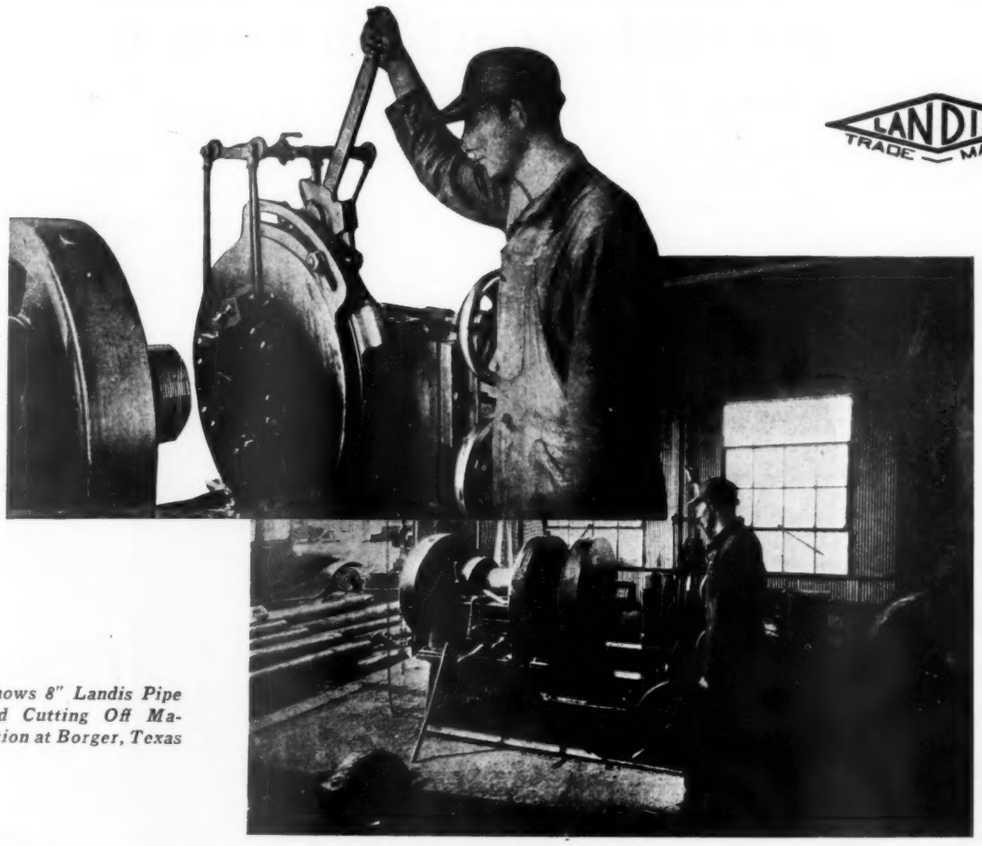
In every Oil Field of the World, Landis Pipe Threading and Cutting Machines are in successful operation—and more are being installed right along.

The new Landis Pipe Machine didn't just happen. It is the outcome of observation, experience and the knowledge of what is required for oil field service.

Years in advance in design and construction of any other, Landis justly deserves its place as a leader and its reputation for good threads and profitable threads.

If your shop is not Landis-equipped write us. There are many interesting facts we can tell you. We can also refer you to enthusiastic users in your neck of the woods.

Will you write now?



LANDIS TRADE MARK

Photograph shows 8" Landis Pipe Threading and Cutting Off Machine in operation at Borger, Texas

LANDIS MACHINE COMPANY, Inc.

WAYNESBORO, PENNA. DETROIT OFFICE: 5928 SECOND BLVD.

BUDA

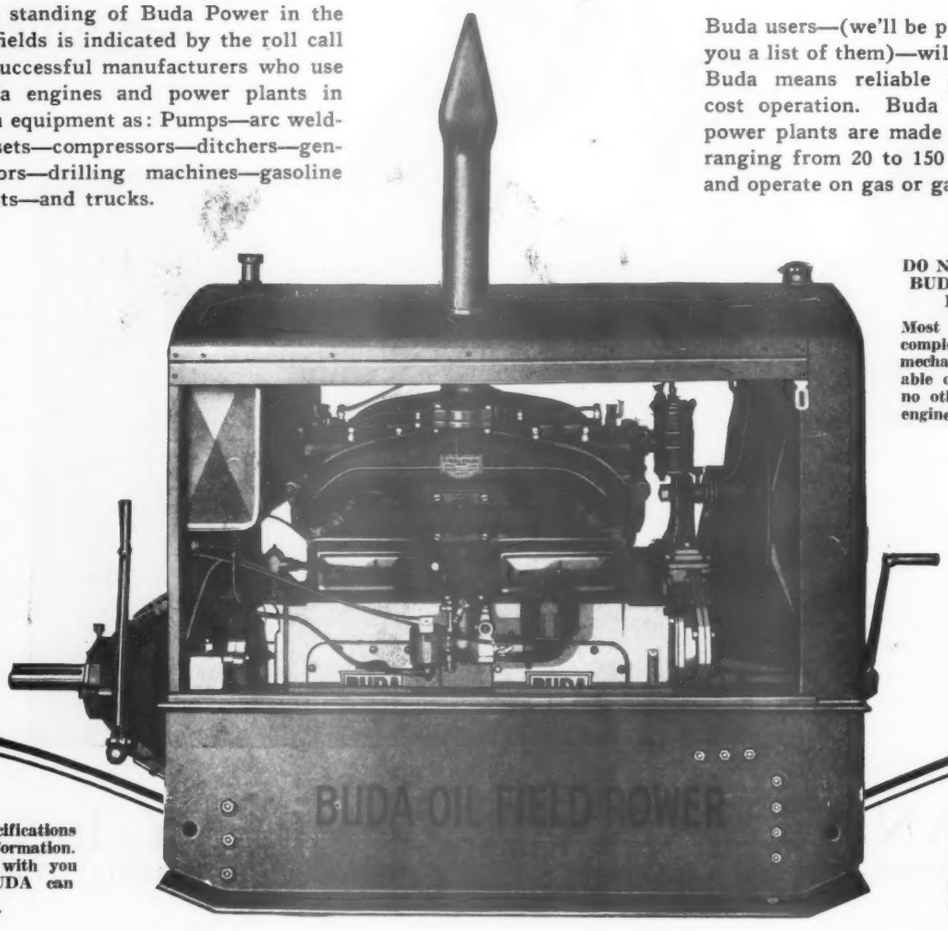
—the *accepted* oil field power unit will be exhibited at our own booth during the Petroleum Show in Tulsa, (Oklahoma Bldg., Nos. 67-68-69-70). You will also see BUDA'S in the booths of many manufacturers—as BUDA POWER is used in fifteen types of oil field equipment.

The BUDA COMPANY, HARVEY, (Chicago Suburb) ILL.

Tulsa, Oklahoma, 311 East Second St.

The standing of Buda Power in the oil fields is indicated by the roll call of successful manufacturers who use Buda engines and power plants in such equipment as: Pumps—arc welding sets—compressors—ditchers—generators—drilling machines—gasoline plants—and trucks.

Buda users—(we'll be pleased to send you a list of them)—will tell you that Buda means reliable power at low cost operation. Buda engines and power plants are made in nine sizes, ranging from 20 to 150 Horse Power and operate on gas or gasoline.



DO NOT FAIL TO SEE BUDA'S DRILLING EQUIPMENT

Most powerful — most completely equipped mechanically—And capable of performing work no other gas or gasoline engine will handle.

Write for specifications and other information. Let us confer with you as to how BUDA can best serve you.

Be sure to see BUDA JH-6 Compressor Engine, 150 H. P., for handling large compressors for flowing wells.

Specifications Completed on All Pipe

Oil Industry Now Provided With Standards for All Classes Necessary for Drilling, Producing and Transportation

By J. Edgar Pew
National Chairman, A.P.I. Committee for Oil Country Tubular Goods.

For the first time in the history of the oil industry, complete specifications are now available on all grades and classes of pipe necessary for the drilling, producing and transporting of oil.

The effect of this work should be far-reaching. It means that, for the first time, the oil industry is in a position to purchase tubular material that is uniformly made as to quality, workmanship and finish, within suitable tolerances, and, what is more important, pipe that is threaded to standard gauges.

This accomplishment is the result of several committees' work, viz.:

A.P.I. Committee on the Standardization of Oil Country Tubular Goods, which prepared specifications on casing, and also prepared specifications on line pipe in co-operation with the Natural Gas Association of America, so that the line pipe specifications should be suitable for both the oil and natural gas industries;

A.P.I. Committee on the Standardization of Rotary Drilling Equipment, which prepared specifications on drill pipe;

A.P.I. Committee on the Standardization of Pumping Equipment, which prepared specifications for tubing.

Every phase of drilling, producing and transporting has been given consideration by these committees in formulating these standards and the results are the best that their knowledge and experience can offer. These committees are composed of practical men, engineers, manufacturers and technical advisors. They are men who are familiar with the uses to which pipe is to be put, and who speak with the authority of experience.

Four Classes of Goods

The four classes of tubular goods on which specifications have been adopted are:

1. Casing—Sizes: 4¾-inch outside diameter to 24½-inch outside diameter inclusive.

2. Drill pipe (for rotary drilling)—Sizes: 2⅜-inch outside diameter to 6⅝-inch outside diameter inclusive.

3. Tubing—(a) Plain—from 2-inch to 4-inch inclusive. (b) External upset—from 1¼-inch to 4-inch inclusive.

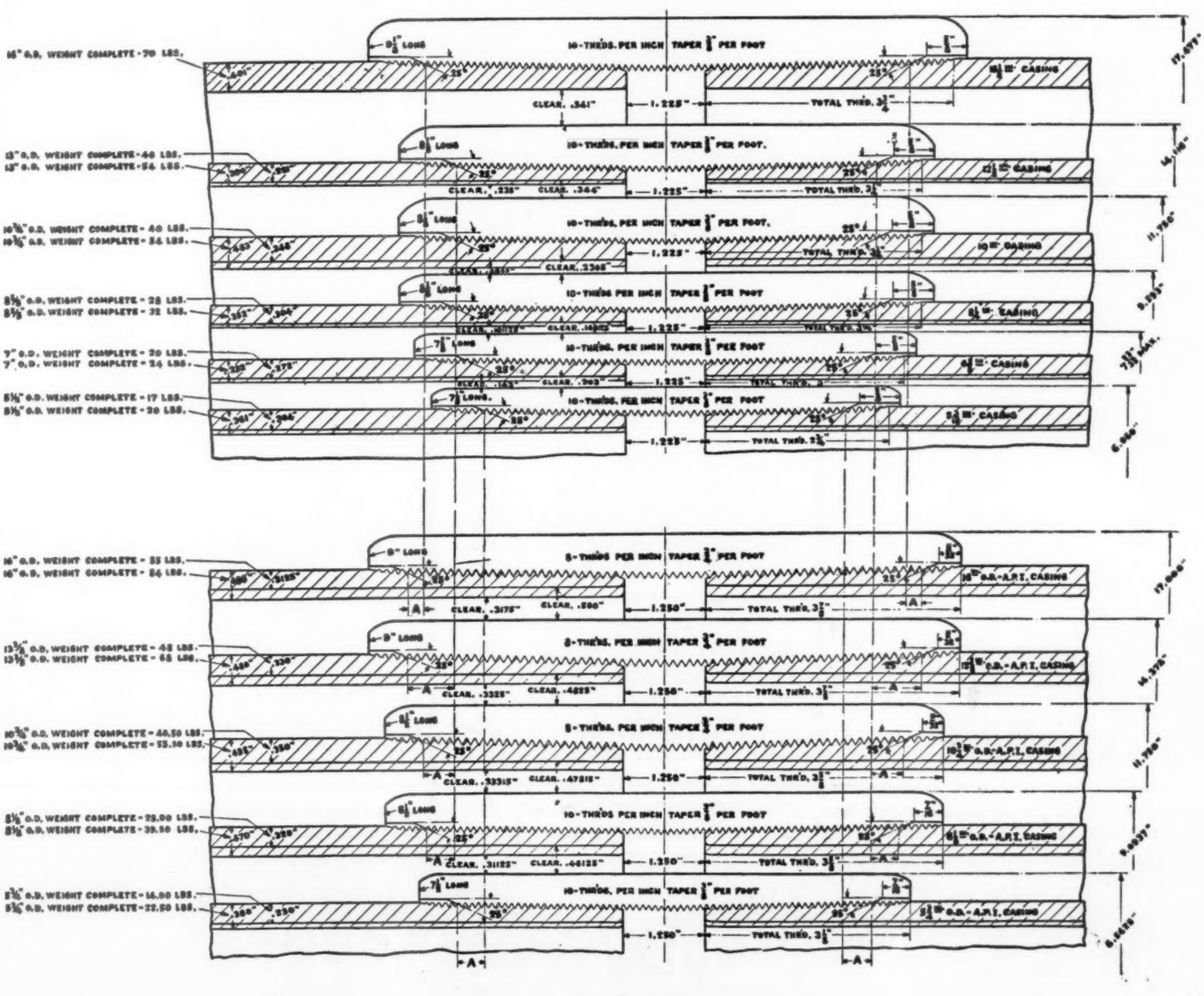
4. Line pipe—Sizes: One-eighth-inch to 20-inch outside diameter, threaded and plain end, and 3½-inch to 24-inch outside diameter, plain end only.

If I were asked the question "What do you consider the most important phase of the A.P.I. pipe standardization work?" I should unhesitatingly reply; "Uniform threading practices and better clearances."

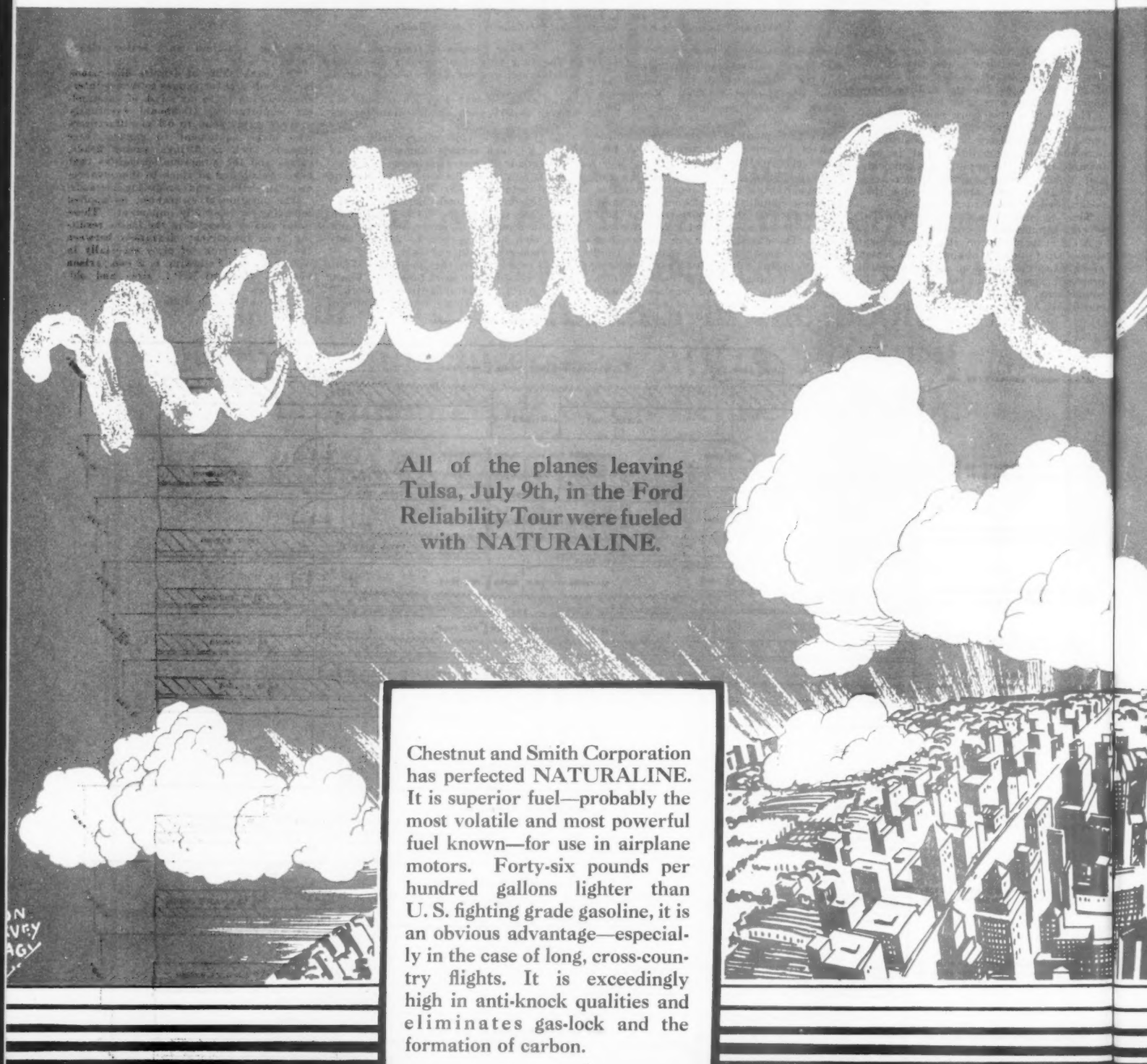
The establishing of definite dimensions for threads and for gauges to insure interchangeability is, to my mind, of outstanding importance. It should eventually prove a great boon to all manufacturers who make equipment to engage these threads, such as fittings, casing heads, valves and the numerous specialties that have contributed so much to the advancement in drilling and producing methods.

The question of clearances, as applied to casing, is especially important. There is no way of computing the losses resulting from insufficient clearances between the various strings of pipe, especially in deeper holes. Following is a comparison between standard A.P.I. sizes and old-style sizes.

(Continued on following page)


ALL WEIGHTS AND DIMENSIONS ARE NOMINAL
16" O.D. WEIGHT COMPLETE - 70 LBS.
13" O.D. WEIGHT COMPLETE - 40 LBS.
13" O.D. WEIGHT COMPLETE - 54 LBS.
10¾" O.D. WEIGHT COMPLETE - 40 LBS.
10¾" O.D. WEIGHT COMPLETE - 54 LBS.
8⅝" O.D. WEIGHT COMPLETE - 28 LBS.
8⅝" O.D. WEIGHT COMPLETE - 32 LBS.
7" O.D. WEIGHT COMPLETE - 20 LBS.
7" O.D. WEIGHT COMPLETE - 24 LBS.
5½" O.D. WEIGHT COMPLETE - 17 LBS.
5½" O.D. WEIGHT COMPLETE - 20 LBS.
8" LONG
10-THDS. PER INCH TAPER ¾" PER FOOT
CLEAR. .341"
1.225"
TOTAL THD. 3½"
16" O.D. WEIGHT COMPLETE - 55 LBS.
16" O.D. WEIGHT COMPLETE - 84 LBS.
9" LONG
8-THDS PER INCH TAPER ¾" PER FOOT
CLEAR. .3175"
CLEAR. .580"
1.250"
TOTAL THD. 3⅝"
13⅜" O.D. WEIGHT COMPLETE - 48 LBS.
13⅜" O.D. WEIGHT COMPLETE - 68 LBS.
CLEAR. .3325"
CLEAR. .4825"
10¾" O.D. WEIGHT COMPLETE - 40.50 LBS.
10¾" O.D. WEIGHT COMPLETE - 55.50 LBS.
CLEAR. .33125"
CLEAR. .47812"
8⅝" O.D. WEIGHT COMPLETE - 28.00 LBS.
8⅝" O.D. WEIGHT COMPLETE - 38.50 LBS.
CLEAR. .31125"
CLEAR. .46125"
7" O.D. WEIGHT COMPLETE - 14.00 LBS.
7" O.D. WEIGHT COMPLETE - 22.50 LBS.
A = INCREASED THREAD ENGAGEMENT OF A.P.I. CASING OVER COMPARATIVE SIZES OF THE PRESENT CASING.
TOTAL CLEARANCE IN EACH CASE IS TWICE THE CLEARANCE SHOWN.

MAKING THE AIR



All of the planes leaving Tulsa, July 9th, in the Ford Reliability Tour were fueled with NATURALINE.

Chestnut and Smith Corporation has perfected NATURALINE. It is superior fuel—probably the most volatile and most powerful fuel known—for use in airplane motors. Forty-six pounds per hundred gallons lighter than U. S. fighting grade gasoline, it is an obvious advantage—especially in the case of long, cross-country flights. It is exceedingly high in anti-knock qualities and eliminates gas-lock and the formation of carbon.

CHESTNUT & SMITH
CORPORATION
Tulsa, Oklahoma

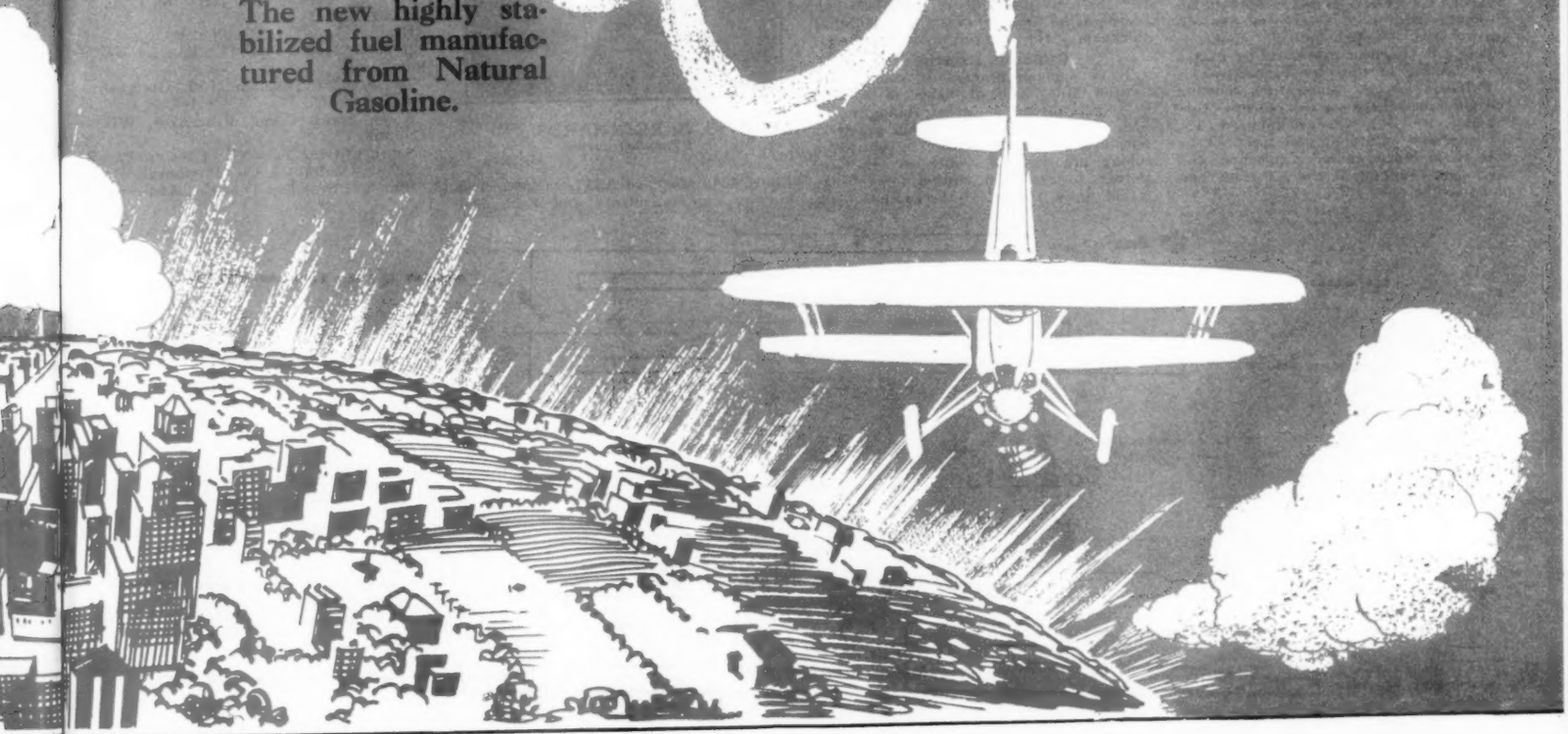
SAFE FOR HUMANITY

NATURALINE

A SUPER AVIATION MOTOR FUEL

Since its advent into the field of aerial fueling, NATURALINE has been written in bold letters across the sky. It plays an important part in the thrilling air drama of today—"making the air safe for Humanity."

The new highly stabilized fuel manufactured from Natural Gasoline.



CHESTNUT & SMITH CORPORATION

Tulsa, Oklahoma

Your attention is called particularly to the clearances between the 5 3-16-inch and the 6⅝-inch in the present old-style sizes as compared to the clearances in the A.P.I. string by the 5¾-inch outside diameter and the 8⅛-inch outside diameter, as follows:

Present old-style sizes: 5 3/16-inch inside of 6⅝-inch. Minimum clearances based on heaviest weights .143-inch, or approximately nine-sixty-fourths-inch. Maximum clearances based on lightest weights .203-inch, or approximately thirteen-sixty-fourths-inch.

A.P.I. sizes: 5¾-inch outside diameter, inside 8⅛-inch outside diameter. Minimum clearances based on heaviest weights .311-inch or approximately five-sixteenths-inch. Maximum clearances based on lightest weights, .461-inch or fifteen-thirty-seconds-inch. Increase in clearance in favor of A.P.I. standards based on heaviest weights: .168-inch or approximately eleven-sixty-fourths-inch.

Increase in clearance in favor of A.P.I. standards based on lightest weights: .258-inch or approximately one-fourth-inch.

Total clearance in each case is twice the values given.

Clearances Important

Clearances in the finishing strings are very important. The present practice of using 5 3-16-inch inside of 6⅝-inch is dangerous and should be discouraged. In many cases, the coupling on the 5 3-16-inch size is turned down to provide better clearances, which tends to weaken the entire string. It will be noted that the better clearances are obtained throughout the entire A.P.I. string as compared to the present old-style sizes.

In a work as large as this, it is natural that there are exceptions that are taken. There is, at the present time, a demand from the Gulf Coast in Texas for two additional sizes, viz.: 7-inch outside diameter and 9⅝-inch outside diameter, which will be given consideration at the next meeting of the pipe committee.

Following is an illustration showing the differences between the old-style tubing and the A.P.I. standard tubing in the 2½-inch size, both plain and upset. Take note of the longer thread engagement and the longer couplings in the A.P.I. as compared to the old-style.

J. EDGAR PEW

could be used without weakening the joint.

One of the problems on tubing was to make as tight a joint as possible in combination with a thread that could better withstand the repeated screwing and unscrewing operations that are necessary when tubing is used. In the smaller sizes of plain tubing, the thickness of the material under the thread prevents the use of a thread larger than 11½-inch, but in the upset, as stated above, 10-thread can be used on account of the additional thickness of the material in the upset end.

California Experience

It is common practice in some cases in the Mid-Continent fields to specify 11½-inch thread on upset tubing in 2-inch and 2½-inch sizes. This practice, I believe, is an outgrowth of the old plain tubing practice. For instance, in California, over several million feet of external upset tubing, 10-thread, has been threaded to standard A.P.I. gauges. The various superintendents and field men in the field. They also provide for special finishing of the plain-end pipe to facilitate the application of gasket-type of couplings that are commonly used in many districts. As in the case of other A.P.I. tubular products, official gauge dimensions have been adopted so that all manufacturers can work to identical gauges.

The A.P.I. Monogram

Practically every manufacturer of tubular material in the United States and Europe has been licensed to use the A.P.I. monogram on pipe, and use of this monogram is visible evidence to the buyer that the material so manufactured complies with A.P.I. pipe specifications in every particular and that the material is

G. A. REINHARDT
Tubular Goods

FRANK TAYLOR
Tubular Goods

National Tube Co., Pittsburgh, Pa.

Pittsburgh Steel Products Co., Pittsburgh, Pa.

Pratt & Whitney Co., Hartford, Conn. (Gauges.)

Reading Iron Co., Reading, Pa.

Republic Iron & Steel Co., Youngstown, Ohio.

The Scottish Tube Co., Ltd., Glasgow, Scotland.

A. O. Smith Corp., Milwaukee, Wis. (Couplings.)

South Chester Tube Co., Chester, Pa.

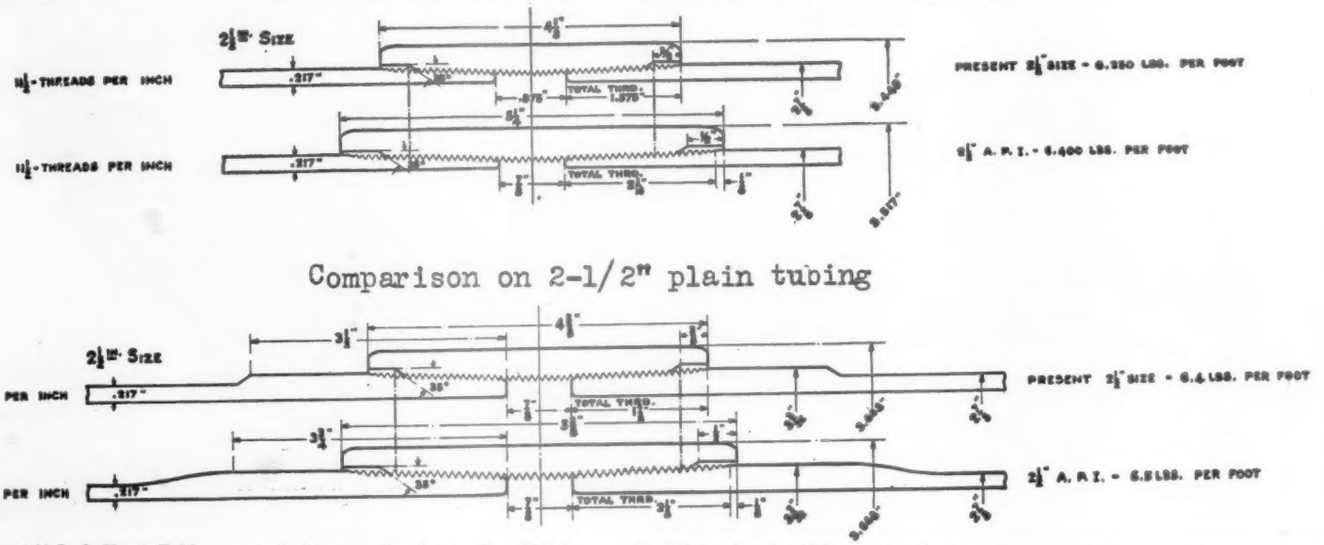
Spang, Chalfant & Co., Pittsburgh, Pa.

Standard Seamless Tube Co., Ambridge, Pa.

Greenfield Tap & Die Corp., Greenfield, Mass. (Gauges.)

Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa. (Couplings.)

Jones & Laughlin Steel Corp., Woodlawn, Pa.


2½" Size
11½ - THREADS PER INCH
.217"
.875"
TOTAL THRD. 1.375"
PRESENT 2½" SIZE - 6.280 LBS. PER FOOT
10 - THREADS PER INCH
TOTAL THRD.
2½" A. P. I. - 6.400 LBS. PER FOOT
Comparison on 2-1/2" plain tubing
PRESENT 2½" SIZE - 6.4 LBS. PER FOOT
2½" A. P. I. - 6.5 LBS. PER FOOT

Comparison on 2½-Inch Upset Tubing

One of the principal requisites in tubing is a tight joint. It will be noted that the thread on plain tubing is 11½-thread per inch, and on upset, it is 10-thread per inch. It is customary in regular pipe practice that the smaller the diameter of the pipe, the finer the thread. One of the reasons for this is that the greater the pitch, the deeper the thread is cut, so that if a coarse thread was put on the smaller size, the strength of the pipe under the thread is materially weakened, i.e., on plain A.P.I. tubing, 3-inch and smaller—the standard thread is 11½, whereas, in the upset, the A.P.I. standard is 10-thread, inasmuch as the upset provides sufficient material under the thread so that the coarser 10-thread used when pumping deep wells, which has demonstrated that 10-thread on the upset is much superior, that it makes a tight joint and withstands the screwing and unscrewing wear much better than the 11½-inch thread.

On line pipe, there have been no changes made in the present practice in sizes of threads as it was felt that the present threads and sizes were giving satisfactory service. The problem of telescoping, as in the case of casing, does not obtain in line pipe. These specifications, however, were very carefully reviewed by a selected committee, experienced in pipe line construction and maintenance. The problem of welding has received special consideration and the specifications contain a recommendation to facilitate the welding of pipe lines in using A.P.I. pipe should be urged to look for this monogram on the material they use as its purpose is for their protection.

Following is a list of the various pipe manufacturers throughout the world who have been licensed to date:

A.P.I. Licensees

Following is a list of companies licensed to use the A.P.I. monogram on oil country tubular goods in accordance with A.P.I. standards No. 5-a: "Pipe Specifications:"

American Seamless Tube Corporation, Los Angeles, Calif.

Babcock & Wilcox Tube Co., Beaver Falls Pa.

Central Tube Co., Pittsburgh, Pa.

A. M. Byers Co., Pittsburgh, Pa.

The British Mannesmann Tube Co., Ltd., London, England.

Ste Ame d'Escaut et Meuse, at Anzin (Nord) France.

Ste Ame des Usines a'Tubes de la Meuse, at Femalle-Haute (Belgium).

Stewarts & Lloyds, Ltd., 41 Oswald St., Glasgow, Scotland.

Wheeling Steel Corp., Wheeling, W. Va.

Youngstown Sheet & Tube Co., Youngstown, Ohio.

Mannesmannrohren-Werke, Dusseldorf, Germany.

Mannesmannrohren-Werke A. G. Kemotau, Czechoslovakia.

Monongahela Tube Co., Pittsburgh, Pa.

American Steel Export Co., New York City.

Vereinigte Stahlwerke, Dusseldorf, Germany.

It Has To Be "There" To Be Standard

Anything "Standardized" has to have the stuff. Nothing is accepted as standard until it has shown its users that it will deliver the goods and stand the gaff.

Year after year an ever increasing majority of those who work with pipe make "Toledo" pipe threading and cutting tools their standard.

The Toledo Pipe Threading Machine Co. originated the "easy operating" tools more than a quarter of a century ago. Since then the company has never yielded first place in production of easy-working pipe tools which operate rapidly and cleanly. There is no let-up in the quality of work done by "Toledo" tools. It stays through an exceptionally long life.

Light—easily transported—yet sturdy. Versatile in the extreme—"Toledos" will get away with baffling emergency jobs, or clean up routine work with production-like speed—whether power is available or not.

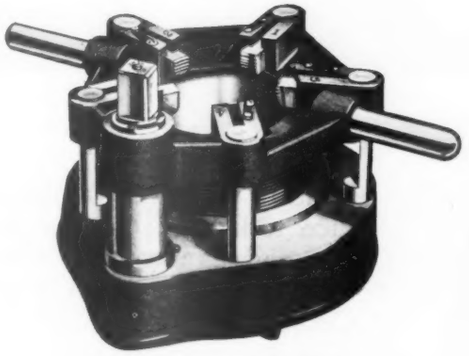
Made for all sizes pipe up to 12". Each tool may be operated by one man—easily, or can be speeded with the Toledo Power Drive.

If you are not standardized on "Toledos," have your supply man show them to you. Three very useful members of the extensive "Toledo" line are shown below.

"Standard, *n.* An established measure of value. A type model or example for comparison. *a.* Having the accuracy or authority of a standard; serving as a gage, test or model."

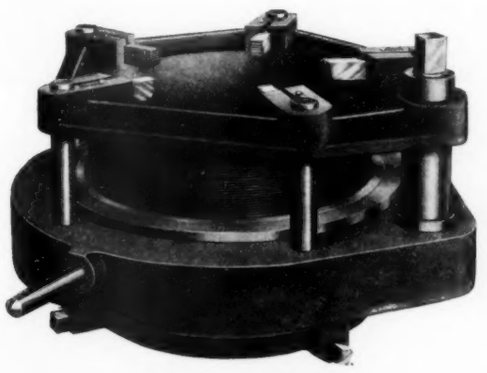
Genuine "Toledos" fully meet the definition of standard. For 25 years they have established their value to hundreds of thousands of owners. They are the model by which other tools are compared, and are accurate to the thousandth of an inch.

Insist on genuine "Toledos," bearing this trade-mark and be sure of the "Toledo" standard.



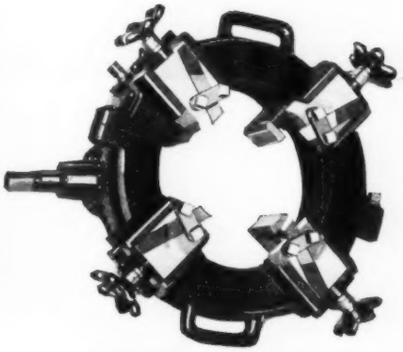
"TOLEDO" GEARED ADJUSTABLE NO. 2

Capacity 2½" to 4" pipe inclusive. "Toledo" receding die principle. A boy can thread 4" pipe with it. Durable, sturdy, light.



"TOLEDO" GEARED ADJUSTABLE NO. 4

Threads 9" to 12" pipe inclusive. One man can operate it. Employs "Toledo" receding die principle. Becomes a production tool if used with "Toledo" Power Drive.



"TOLEDO" GEARED PIPE CUTTERS

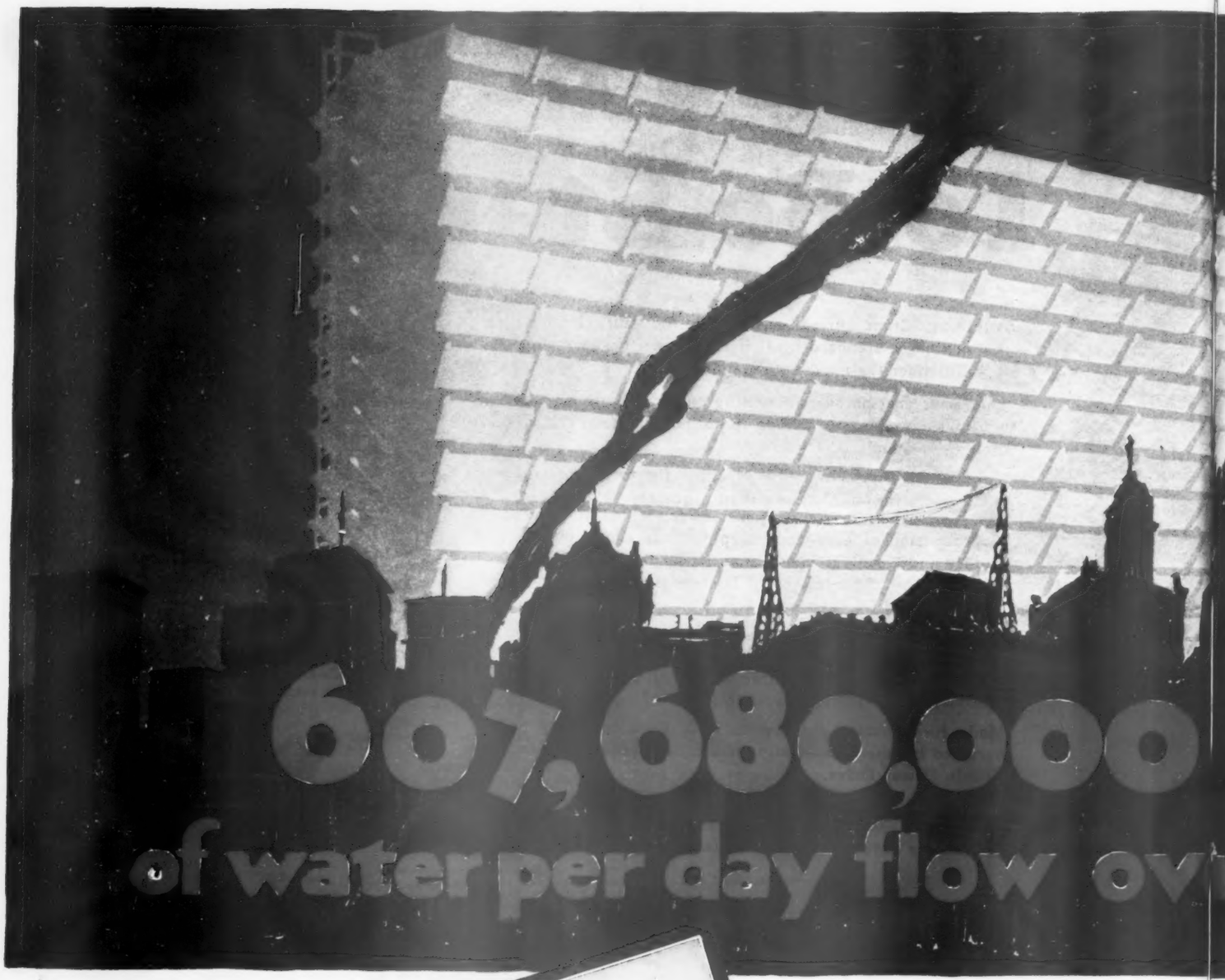
Four sizes embracing 2½" to 12" pipe inclusive. Using these cutters, one man can easily cut large pipe accurately, leaving a square end without burr. Extremely rapid with "Toledo" Power Drive.

A Post Card to Us Brings You Our Complete Catalogue

The Toledo Pipe Threading Machine Co.

Originators of the Easy Threaders

TOLEDO, OHIO



Braun Cooling Tower Fabrication Mill and Storage for lumber and fabrication parts.

Braun Cooling Towers in service today are cooling this tremendous amount of water every 24 hours. Total Braun Cooling Tower capacity installed during the first seven months of this year *represents*

35% Increase

over that installed during a similar period in any previous year.

BRAUN

Enough water to supply the daily need of an industrial city the size of Chicago

BRAUN

C·F·BRAUN & CO. *Manufacturing Mechanical* ENGINEERS
ALHAMBRA, CALIFORNIA
TULSA DALLAS NEW YORK

Acieries & Usines a Tubes, De La Sarre, Paris, France.

Vitkovice Mines, Steel and Ironworks Corp., Czechoslovakia.

Allegheny Steel Co., Brackenridge, Pa.

The Taft-Pierce Mfg. Co., Woonsocket, R. I. (Gauges only.)

Arrangements have been made with the National Physical Testing Laboratory in Teddington, London, England, to calibrate the gauges of foreign manufacturers so that they may test their gauges from time to time in order to bring them to standard, without reshipping them to the Bureau of Standards in Washington. This means that pipe made to A.P.I. pipe specifications can be safely purchased throughout either Europe or the United States.

Support of Operators

If the A.P.I. pipe standardization program is to be a success it must receive the hearty support of the operators. Many of the larger companies are now specifying A.P.I. standards exclusively. Others have taken exceptions to some of the sizes and threads that have been adopted. I believe this position is honestly taken and not through a desire to hinder the A.P.I. standardization program; however, if this practice is continued, the full benefits of standardization can easily be retarded.

There is no question but what we are securing better threads on our tubular goods since the commencement of this standardization work. The influence of the work has extended to other materials even before standardization was completed on such materials. For example, on line pipe, on which we have just completed tentative specifications, an instance is shown where 900 joints were laid with a pipe laying machine in 11 hours working time. A record of this kind, with a pipe laying machine, would be impossible without practically perfect threads.

It behooves all of us, therefore, to get actively behind this program and give it our hearty endorsement and trial.

EARL C. SLEEMAN
Tubular Goods

A.P.I. SPECIFICATIONS FOR OIL COUNTRY TUBULAR GOODS

Material Covered

1. These specifications apply to lapwelded and seamless steel and iron tubular goods for oil country purposes; covering, drill, pipe, casing and tubing. Where the term "pipe" is used in these specifications it is intended to cover all classes referred to.

Section 1—Manufacture

Process

2. The steel for welded drive pipe casing and tubing shall be of good welding quality made by the Bessemer, open hearth or electric process. The steel for lapwelded drill pipe shall be made by the open hearth process, and the steel for all seamless drill pipe shall be made by the electric or open hearth process. Seamless drill pipe and its couplings shall be made of Grade B or Grade C steel. Upset end drill pipe to have upset of the diameters and lengths as indicated in tables appended.

2-a. The wrought iron shall be made from muck bars made entirely from puddled pig iron, free from any admixture of iron scrap or steel.

Iron Scrap

2-b. This term applies only to foreign or bought scrap and does not include local mill products free from foreign or bought scrap.

2-c. Open hearth iron.

Section 2—Chemical Properties and Tests

3. Open hearth iron should contain not less than 99.75 per cent metallic iron.

3-a. The steel shall conform to the following requirements as to chemical composition:

	Bessemer	O. H. Welded		Seamless		
	Welded	Class I	Class II (Rephos.)	Grade A	Grade B	Grade C
Manganese	.30-.80	.30-.60	.30-.60	.30-.60	.35-1.50	.35-1.50
Phosphorus,						
Not over	.11	.045	.08	.04	.04	.04
Not less than	..	..	.045	..	..	..
Sulphur, not over	.065	.06	.06	.06	.06	.06

Foot Note—Rephosphorized open hearth pipe shall be marked by the letter "R" stamped with a steel stencil directly alongside the A.P.I. monogram, the size of the letter to be the same as the A.P.I. monogram.

It will be noted in the table under "Physical Properties and Tests" that rephosphorized open hearth welded pipe has higher tensile strength and higher yield point than Class I open hearth welded pipe, and as a consequence is probably somewhat harder to bend. It probably has better threading and lap welding properties.

Check Analysis

4-a. Analyses of two lengths of pipe in each lot of 400 or less of each size under 6 inches, and in each lot of 200 or less of each size 6 inches or over, may be made by the purchaser from the finished pipe. By agreement between the manufacturer and the purchaser, the analyses may be taken from the skelp in cases of lapwelded pipe. When taken from the skelp, the number of analyses per lot shall be determined in the same manner as when taken from the finished pipe, except in no case shall there be less than one analysis for each heat.

4-b. If the analysis of only one length of pipe or piece of skelp does not conform to the requirements specified, analyses of two additional lengths of pipe or pieces of skelp from the same lot or heat shall be made, each of which shall conform to the requirements specified.

4-c. Drillings for analyses shall be taken from several points around each length of pipe or across the pieces of skelp selected for test.

4-d. Ladle analyses on each heat of steel shall be furnished by the manufacturer if requested by the purchaser, and shall comply with the requirements of paragraph 3-a.

Section 3—Physical Properties and Tests

Tension Tests

5-a. The material shall conform to the following minimum requirements as to tensile properties:

	Bessemer	O. H. Welded		Seamless		
	Welded	Class I	Class II (Rehos.)	Grade A	Grade B	Grade C
STEEL						
Tensile Strength, Pounds, per square inch	50,000	45,000	48,000	48,000	70,000	75,000
Yield Point, Pounds per square inch	30,000	25,000	28,000	30,000	40,000	45,000
Elongation in 8-inch, per cent	20	22	20	..	..	..
Elongation in 2-inch, per cent	..	..	..	40	25	20
WROUGHT IRON						
Tensile Strength, pounds per square inch						42,000
Yield Point, pounds per square inch						24,000
Elongation in 8-inch, per cent						12
OPEN HEARTH IRON						
Tensile Strength, pounds per square inch						45,000
Yield Point, pounds per square inch						25,000
Elongation in 8-inch, per cent						22

5-b. The yield point shall be determined by the drop of the beam of testing machine, by dividers, or any other approved methods.

Hydrostatic Tests

6-a. The lengths of oil country tubular material shall each be tested at the mill at any point between the minimum and maximum hydrostatic pressures specified in tables appended. (See Table 1.) Lapwelded pipe shall be struck near both ends while under pressure, a blow with a two-pound hammer or its equivalent and the hydrostatic pressure specified shall be maintained for not less than five seconds.

6-b. The test pressure on sizes not listed should not exceed those required by the formula:

$$P = \frac{2St}{D}$$

in which P equals the pressure in pounds per square inch;

S equals allowable fiber stress 16,000 pounds per square inch maximum pressure and 14,000 pounds per square inch minimum pressure for steel pipe; 14,000 pounds per square inch maximum and 12,500 pounds per square inch minimum for open hearth iron; and 12,000 pounds per square inch maximum and 10,700 pounds per square inch minimum for wrought iron pipe, but no pressure need exceed 2,500 pounds;

t equals thickness of the wall in inches;

D equals outside diameter in inches.

Flattening Tests

7-a. The crop ends cut from each length of steel or open hearth iron lapwelded pipe shall withstand flattening between parallel plates, until the distance between the plates is one-third the outside diameter of the pipe, without cracking or showing any injurious flaws. The tests shall be made with the weld approximately 45 degrees from the point of the maximum bend. If any section fails, another piece may be cut. Should the second test fail, additional tests may be made until the test meets the requirements, provided that the finished pipe shall not be shorter than 80 per cent of its length after the first crop has been made.

7-b. The crop ends cut from each length of lapwelded wrought iron pipe shall be flattened until broken. The test shall be made with the weld approximately 45 degrees from the point of maximum bend. The test piece must show a good lap weld and the fracture shall have a fibrous appearance. If any section fails to meet these requirements, another piece may be cut. If the second test should fail, additional tests may be made until the test meets the requirements, provided that the finished pipe shall not be shorter than 80 per cent of its length after the first crop has been made. Precautions shall be taken so that crop ends can be identified with respect to the length from which they are cut.

Drift Tests

8-a. Each length of casing and drive pipe shall be drifted with cylindrical mandrels of the following dimensions:

Diameter	Length
For sizes up to 8-5/8" O.D., inclusive	1/8" smaller than nominal I.D., of pipe — 6 inches
For sizes over 8-5/8" O.D. to 14" O.D., inclusive	5/32" smaller than nominal I.D., of pipe — 12 inches
For sizes over 14" O.D.	3/16" smaller than nominal I.D., of pipe — 12 inches

8-b. All tubing up to and including 2½-inch shall be drifted to insure free passage of a plunger 42 inches long and 3/32 inch smaller than nominal inside diameter of tubing. On sizes larger than 2½ inches the plunger shall be one-eighth inch smaller than nominal inside diameter of tubing.

Test Specimens

9-a. Tension test specimens shall consist of sections cut longitudinally from either end of the pipe (when not pulled in full sections, as would probably be the case in the smaller sizes of pipe). They shall not be flattened before testing. The specimens from welded pipe shall be taken from a point approximately 90 degrees from the weld, since this is to be a test of the material and not the weld. By agreement between the manufacturer and purchaser, the test specimens for welded pipe may be taken from the skelp.

H. J. MORLANG
Tubular Goods

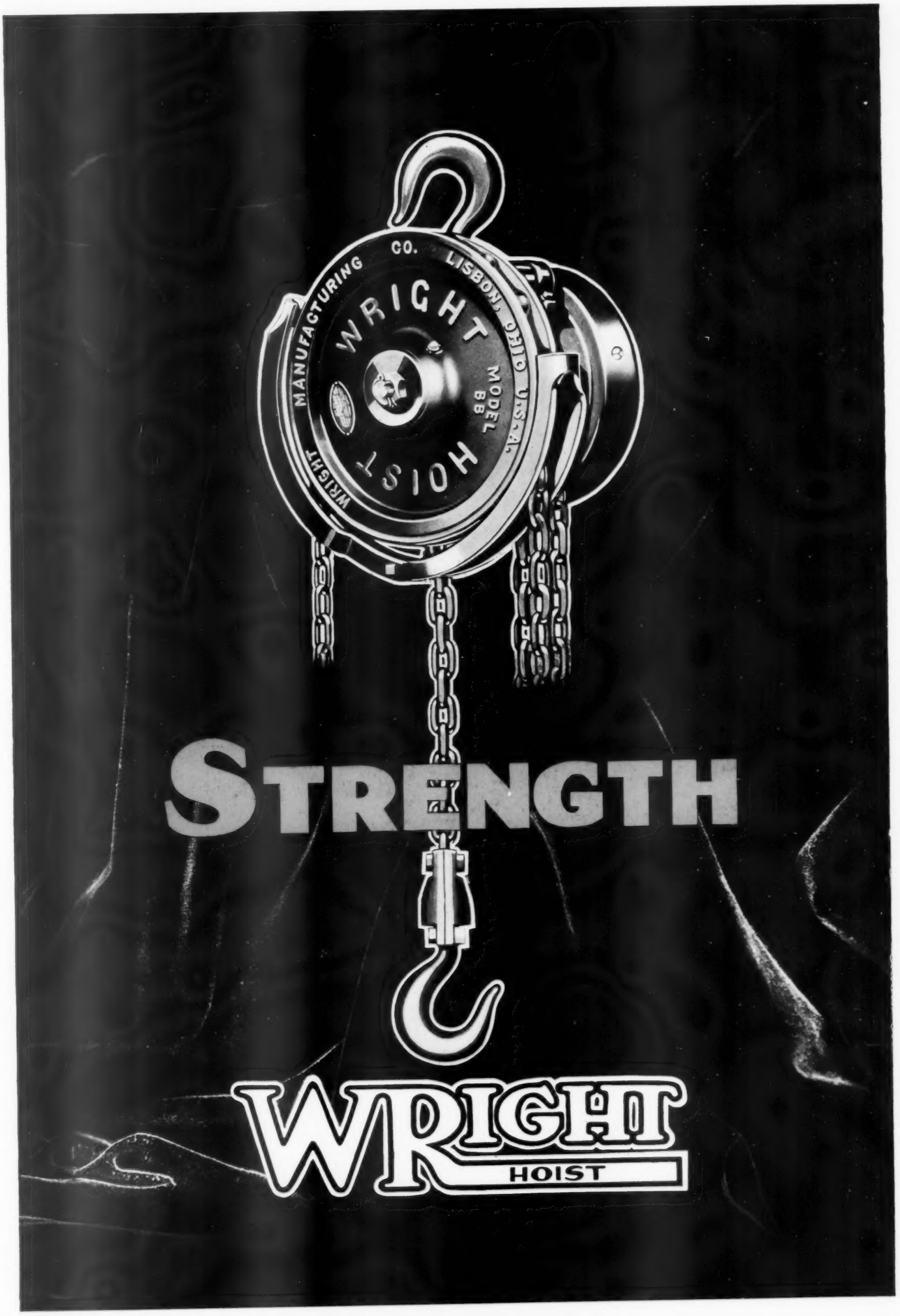
V. D. MOODY
Tubular Goods

9-b. All testing shall be done cold.

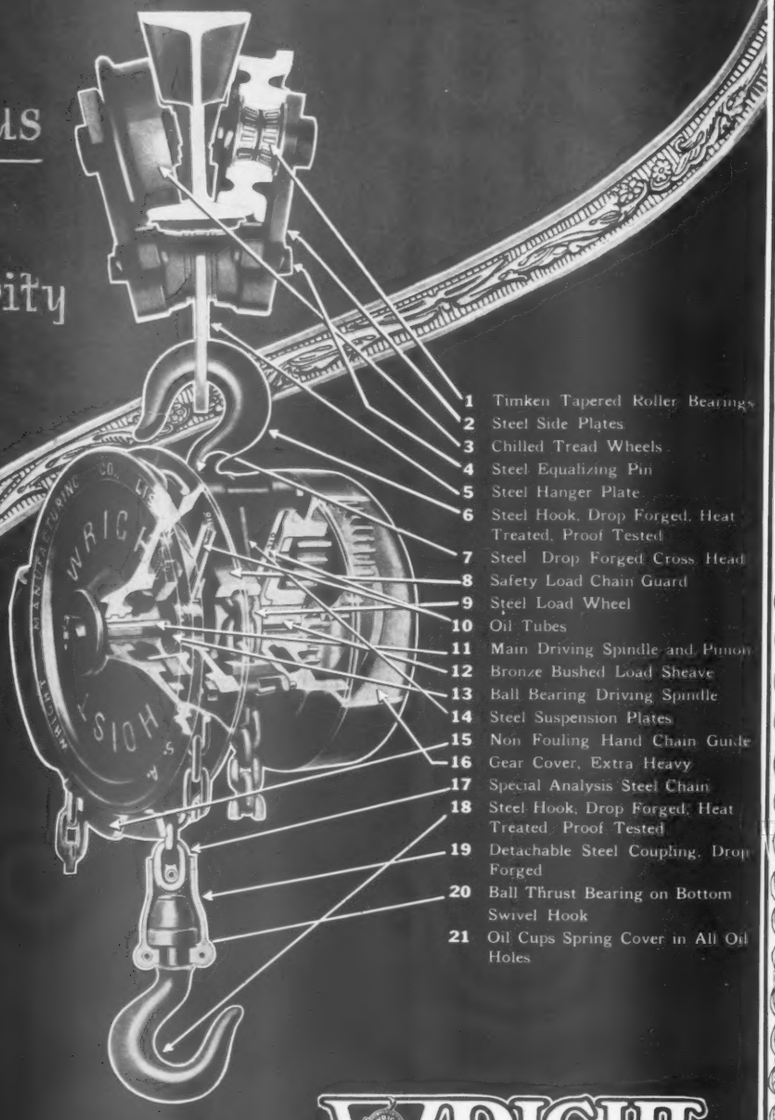
Number of Tests

10. One of each of the tests specified in Section 5-a may be made on a length in each lot of 400 or less, of each size under 6 inches, and in each lot of 200 or less, of each size 6 inches or over. When taken from the skelp the number

(Continued on Page 195)


WRIGHT
MANUFACTURING CO. LISBON, OHIO U.S.A.
WRIGHT
HOIST
MODEL
88
STRENGTH
WRIGHT
HOIST

21 Plus Points of Superiority



1. Timken Tapered Roller Bearings
2. Steel Side Plates
3. Chilled Tread Wheels
4. Steel Equalizing Pin
5. Steel Hanger Plate
6. Steel Hook, Drop Forged, Heat Treated, Proof Tested
7. Steel Drop Forged Cross Head
8. Safety Load Chain Guard
9. Steel Load Wheel
10. Oil Tubes
11. Main Driving Spindle and Pinion
12. Bronze Bushed Load Sheave
13. Ball Bearing Driving Spindle
14. Steel Suspension Plates
15. Non Fouling Hand Chain Guide
16. Gear Cover, Extra Heavy
17. Special Analysis Steel Chain
18. Steel Hook, Drop Forged, Heat Treated, Proof Tested
19. Detachable Steel Coupling, Drop Forged
20. Ball Thrust Bearing on Bottom Swivel Hook
21. Oil Cups Spring Cover in All Oil Holes

WRIGHT

MANUFACTURING COMPANY - LISBON, OHIO

© STAFF

A.P.I. SPECIFICATIONS FOR STANDARD RIG IRONS

(Continued from page 152)

rig irons may be made in two lengths of shafts, 7 feet 6 inches and 8 feet no inches.

6-m. The A.P.I. monogram shall be cast on the same side of the crank as the manufacturer's name or trademark, and shall be stamped with a steel stencil on the end of the shaft.

Band Wheel Flanges

6-n. Band wheel flanges of the sizes and dimensions and within the tolerances specified in Figures 6 and 7, and Table 5 are standard for 4½-inch, 5-inch and 6-inch rig irons.

6-o. All bore and keyways dimensions shall be as specified in Section 5.

6-p. The A. P. I. monogram shall be cast on band wheel flanges on the same side as the manufacturer's name or identifying mark.

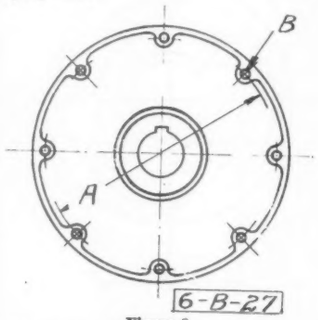


Figure 6
Band Wheel Flanges for 4½-inch and 5-inch Rig Irons

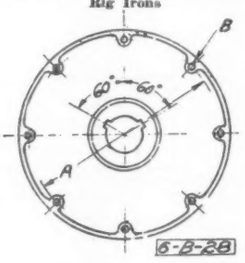


Figure 7
Band Wheel Flanges for 6-inch Rig Irons

TABLE 5
Band Wheel Flanges
For 4½-inch, 5-inch and 6-inch Rig Irons
See Figures 6 and 7
All dimensions in inches at 68 degrees Fahrenheit.

	4½" Dimension	5" Dimension	6" Dimension Standard	6" Alternate **
"A" diameter of bolt circle	27	27	32	42
"B" size of bolts	⅞	⅞	1	1
Number of bolts	8	8	8	12
Number of keyways required	1	1	*2	*2

*Spaced 180 degrees. **Note that alternate flange is to be of steel, with 12-1 inch bolts, instead of 8 as shown in Figure 7.

Wrist Pins

6-q. The wrist pine, with nut attached, shall be considered as one unit; threads to be left hand.

6-r. Wrist pins of the sizes and dimensions and within the tolerances specified in Figure 8 and Table 6, are standard.

6-s. The A.P.I. monogram shall be stamped with a steel stencil on the large end.

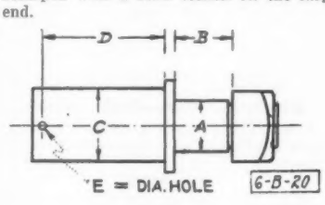


Figure 8
Wrist Pins

TABLE 6
A.P.I. Standard Wrist Pins
See Figure 8
All dimensions in inches at 68 degrees Fahrenheit

	Crank Fit "A"	Tolerance	"B"	Pitman Ft "C"	"D"	"E"
4½" Rig Irons	2.750"	+.002" −.000"	3½"	3½"	7¼"	9/16"
5" Rig Irons	2.750"	+.002" −.000"	3½"	3½"	7¼"	9/16"
6" Rig Irons	3.500"	+.002" −.000"	4"	4"	7¼"	9/16"

SECTION 7
Sand Reels

7-a. By the "size" of sand reel is meant the nominal diameter and length of the shaft. All A.P.I. standard sand reels have double drums.

7-b. Five sizes of sand reels are standard, as follows:

Four inches by 9 feet no inches with 36-inch bevel-faced friction pulley.

Five inches by 10 feet no inches with 42-inch bevel-faced friction pulley.

Four inches by 9 feet no inches with 38-inch straight-faced friction pulley.

Five inches by 10 feet no inches with 42-inch straight-faced friction pulley.

Six inches by 10 feet no inches with 10-inch by 42-inch straight-faced brake pulley, and 14-inch by 42-inch concave-faced friction pulley.

7-c. Sand reels manufactured in accordance with Figures 9 and 10 and Table 7, are standard.

7-d. All shaft diameters, bores of pulleys, etc., keys and keyways, shall be as specified in Section 5.

7-e. The A.P.I. monogram shall be cast on sand reel pulleys on the same side as the manufacturer's name or identifying mark.

7-f. The A.P.I. monogram shall be stamped with a steel stencil on the end of sand reel shafts.

SECTION 8
CALF-WHEEL ATTACHMENTS

Calf-Wheel Sprocket Rim for 6-inch Rig Irons

8-a. The calf-wheel sprocket rim, solid or split type, shal have the essential dimensions shown in Figure 11.

8-b. The teeth of the calf-wheel sprocket rim shall be made to fit A.P.I. Chain No. 3 (No. 1030 or SS-40), and the tooth form shall be the A.P.I. standard. (Every other tooth may be eliminated.)

8-c. The A.P.I. monogram shall be cast on the same side as the manufacturer's name or identifying mark.

Calf-Wheel Clutch Sprocket for 6-inch Rig Irons

8-d. The calf-wheel clutch sprockets shall be in accordance with the essential dimensions and within the tolerances specified in Figure 12.

8-e. The teeth for the calf-wheel clutch sprockets shall be made to fit A. P.I. Standard Chain No. 3 (No. 1030 or SS-40), and shall have the standard A. P.I. tooth form.

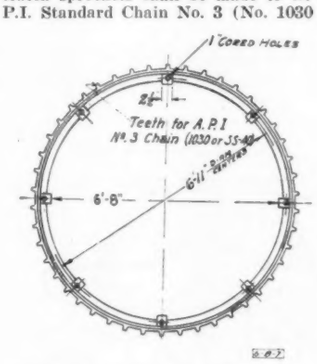


Figure 11—Chalf-Wheel Sprocket Rim

8-f. A.P.I. clutch sprockets may have 18 or 21 teeth, based on eliminating every other tooth; sprockets with 21 teeth will be furnished unless 18-tooth sprockets are specified.

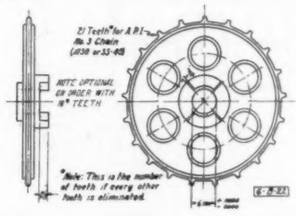


Figure 12—Calf-Wheel Clutch Sprocket

8-g. The A.P.I. monogram shall be cast on the same side as the manufacturer's name or identifying mark.

Clutch and Key for Calf-Wheel Attachment for 6-inch Rig Irons

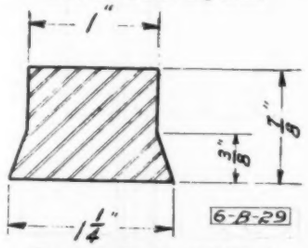


Figure 13—Key for Calf-Wheel

8-h. The calf-wheel clutch shall be in

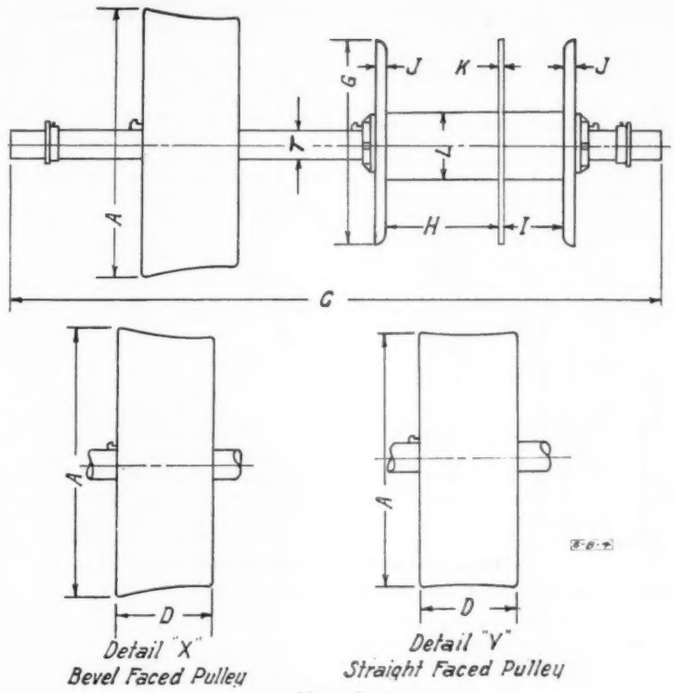


Figure 9
Sand Reels—Single Pulley

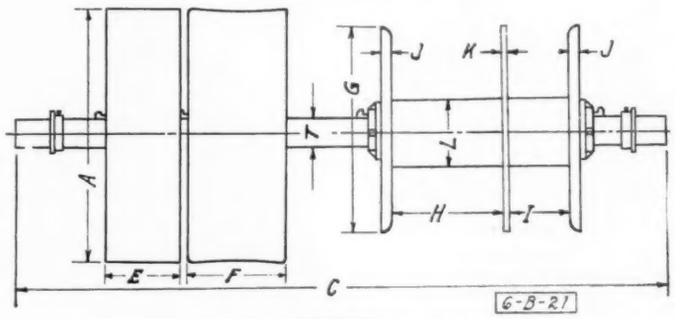


Figure 10
SAND REELS—DOUBLE PULLEY

TABLE 7
A.P.I. STANDARD SAND REELS
See Figures 9 and 10
All Dimensions in Inches except length of shaft, which is given in feet

Size—	4"x9'0"	4"x9'0"	5"x10'0"	5"x10'0"	6"x10'0"
Type of Pulley—	Single bevel Faced	Single straight Faced	Single bevel Faced	Single straight Faced	Double straight Faced
Pulley sketch detail	"X"	"Y"	"X"	"Y"	"E" & "F"
A=Dia. of Pulley	36	38	42	42	42
T=Nominal Dia. of Shaft	4	4	5	5	6
C=Length of Shaft	9'0"	9'0"	10'0"	10'0"	10'0"
D=Width of single pulley	..	..	..	..	..
E=Width of brake pulley	..	..	..	..	10
F=Width of friction pulley	..	..	..	..	14
G=Diameter of flange	..	..	..	..	40
H=Width of wide drum	..	..	..	..	24
I=Width of narrow drum	..	..	..	..	14
J=Thickness of outer flange	..	..	..	..	½
K=Thickness of center flange	..	..	..	..	⅞
L=Diameter of pipe drum	..	..	..	..	12

See Table 9 for Sand-Reel Shaft Set Collars.

accordance with the essential dimensions and tolerances shown in Figure 14.

8-i. The A.P.I. monogram shall be cast on the clutch on the same side as the manufacturer's name or identifying mark.

8-j. The calf-wheel clutch key shall be in accordance with the dimensions shown in Figure 13.

8-k. The A.P.I. monogram shall be stamped with a steel stencil on the 1-inch side of the key.

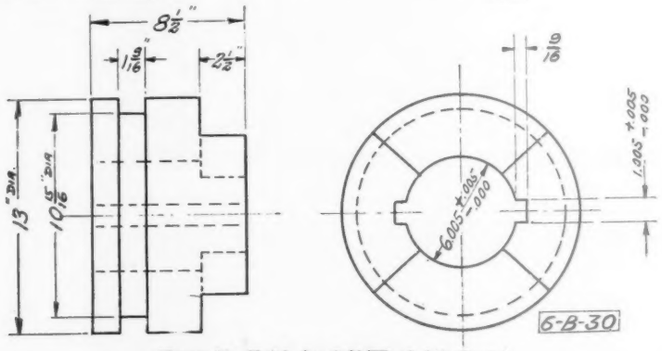


Figure 14—Clutch for Calf-Wheel Attachment

Clutch Straps for Clutches for 6-inch Rig Irons

8-l. Clutch straps shall be considered as one unit, and shall be in accordance with the dimensions shown in Figure 15.

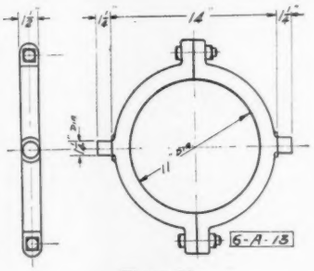


Figure 15

SECTION 9

Rope Pulleys and Sheaves for Rig Irons

9-a. Two sizes of crown pulleys, two sizes of casing line pulleys and one size of sand line sheaves are standard for all sizes of rig irons, as shown in Figure 16 and Table 8.

9-b. The grooves of crown (drilling) pulleys shall be made for 1-inch rope as standard, when wire rope is used, and for 2¼-inch cable when manila cable is used, unless otherwise specified.

9-c. Combination sheaves, or sheaves built for use with both manila and wire lines, are not standard.

9-d. The form of groove for casing line pulleys shall be made for 1-inch wire rope, unless otherwise specified.

9-e. The groove for sand line sheaves shall be made for ⅝-inch rope as standard.

9-f. The form of groove for all rope pulleys shall be the A.P.I. standard. (See A.P.I. standard 9-A: "Wire Rope," and A.P.I. standard 9-B: "Manila Cordage").

9-g. The A.P.I. monogram shall be cast on all rig iron pulleys, on the same side as the manufacturer's name or identifying mark.

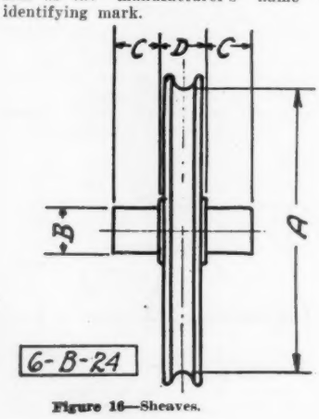


Figure 16—Sheaves.

TABLE 8

A.P.I. Standard Sheaves

See Figure 16

All Dimensions in Inches

	A	B	C	D
Crown (Drilling) Sheaves	30	5	5	5
Crown (Drilling) Sheaves, Opt.	36	5	5	5
Sand Line Sheaves	23¾	5	5	5
Casing Line Sheaves	18½	5	5	5
Casing Line Sheaves, Opt.	26	5	5	5

SECTION 10

Pig Iron Miscellany

Set Collars for Crank and Sand Reel Shafts

10-a. Shaft set-collars, of the bore dimensions and within the tolerances specified in Figure 17 and Table 9, are standard.

10-b. All set collars shall be provided with set screws.

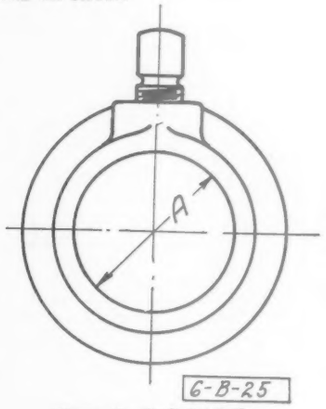


Figure 17—Shaft Set Collars.

TABLE 9

A.P.I. Standard Set Collars

See Figure 17

All Dimensions in Inches at 68 Degrees Fahrenheit.

Size	Bore Diameter "A" Tolerance
4" Sand Reels	4.005" +.031" −.000"
4½" Rig Irons	4.505" +.031" −.000"
5" Sand Reels	5.005" +.031" −.000"
5" Rig Irons	5.005" +.031" −.000"
6" Rig Irons	6.005" +.031" −.000"

Jack-Post Boxes

11-a. Front and back jack-post boxes manufactured in accordance with Figure 18 and Table 10, are standard.

11-b. The A.P.I. monogram shall be cast on the same section as the manufacturer's name or identifying mark.

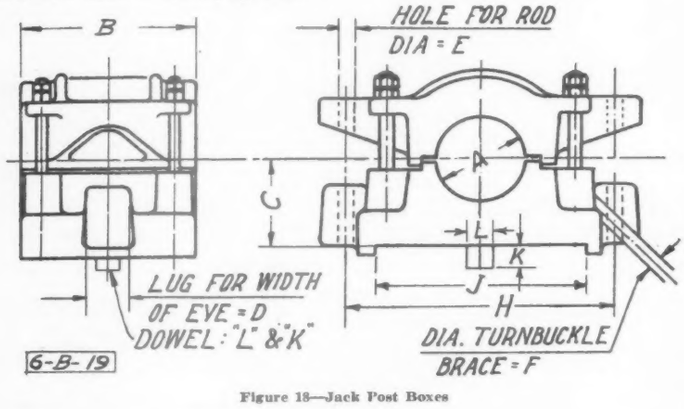


Figure 18—Jack Post Boxes

TABLE 10

A.P.I. STANDARD JACK-POST BOXES

See Figure 18.

All Dimensions in Inches.

	"A"	"B"	"C"	"D"	"E"	"F"
Front—						
For 4½" Rig Irons	4½	10½	5	4¼	1¼	1¼
For 5" Rig Irons	5	14	6	4¼	1½	1½
For 6" Rig Irons	6	14	6¾	4¼	1½	1½
Back—						
For 4½" Rig Irons	4½	9	5	4¼	1¼	1¼
For 5" Rig Irons	5	12	6	4¼	1½	1½
For 6" Rig Irons	6	12	6¾	4¼	1½	1½

Tentative Dimensions, All Sizes—

Diameter "L" of dowel ..... 2"
Length "K" of dowel ..... 2"
Distance "J" between beads ..... 14"
Distance "H" between hold-down bolts. 18"

Saddles

12-a. Saddles for 4½, 5 and 6-inch rig irons are designed to fit either 12 or 14-inch walking beams; the size of the trunnions and the spacing and coring of bolt holes to be as specified in Figure 19 and Table 11.

12-b. The A.P.I. monogram shall be cast on the same side as the manufacturer's name or identifying mark.

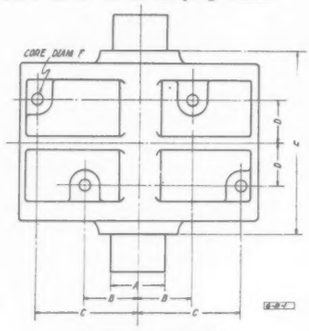


Figure 19—Saddles

TABLE 11

A.P.I. STANDARD SADDLES

See Figure 19.

All Dimensions in Inches

	4½" Rig Irons	5" Rig Irons	6" Rig Irons
A	4½	4½	5½
B	4½	4½	4½
C	8½	8½	8½
D	3½	3½	3½
E	13	13	13
F	1	1	1

Side Irons

13-a. Side irons, including caps, shall be considered as one unit.

13-b. Side irons of the dimensions shown in Figure 20 and Table 12 shall be standard for 4½, 5 and 6-inch rig irons.

13-c. The A.P.I. monogram shall be cast on the same side as the manufacturer's name or identifying mark.

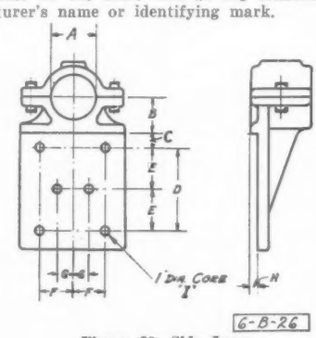


Figure 20—Side Irons

TABLE 12

A.P.I. STANDARD SIDE IRONS

See Figure 20. All Dimensions in Inches.

	*4½" Rig Irons	*5" Rig Irons	6" Rig Irons
A	4½	4½	5½
B	6	6	6
C	1¾	1¾	1¾
D	8	8	8
E	...	...	4
F	4	4	4
G	...	...	2½
H	1	1	1
I	1	1	1

*Side irons for 4½-inch and 5-inch rig irons have only four bolt holes, as shown by "D" and "F" in Figure 20; side irons for 6-inch rig irons have six bolt holes, as shown.

Gudgeons for Bull and Calf-Wheels

14-a. Gudgeons having the dimensions shown in Figure 21 and Table 13 are standard for 4½, 5 and 6-inch rig irons.

14-b. The A.P.I. monogram shall be cast on the same side as the manufacturer's name or identifying mark.

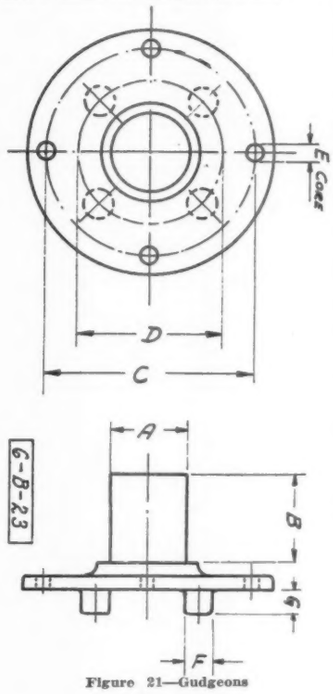


Figure 21—Gudgeons

TABLE 13

A.P.I. STANDARD GUDGEONS

See Figure 21

All Dimensions in Inches

	'A'	'B'	'C'	'D'	'E'	'F'	'G'
4½ Rig Irons	5	5½	11¼	9	1⅛	1¾	2
5 Rig Irons	5	5½	11¼	9	1⅛	1¾	2
6 Rig Irons	5	5½	13	9	1⅛	1¾	2

Pitman Stirrups

15-a. Pitman stirrups of the dimensions and sizes shown in Figure 22 and Table 14 are standard.

15-b. The A.P.I. monogram shall be stamped with a steel stencil on the flattened section carrying the manufacturer's name or identifying mark.

TABLE 14

A.P.I. STANDARD PITMAN STIRRUPS

See Figure 22

All Dimensions in Inches.

	4½"	5"	6"	6" Pump. Serv.
A Stock size of Stirrup	2¼	2¼	2½	3 2¼
B Beams	14	14	14	14 12
C	5¾	5¾	5¾	5¾ 5¾
D	30	30	40	40 30
E	4	4	..	.. 4
F	..	..	4	4 ..
G	..	..	1	1 ..
H: Size of Bolt	¾	¾	⅞	1 ¾
No. of Bolt Holes	5	5	6	8 5

Recommendations—Brake Bands

16-a. Three sizes (widths only) of brake bands are recommended: 7, 9 and 12-inch.

Guy Wire

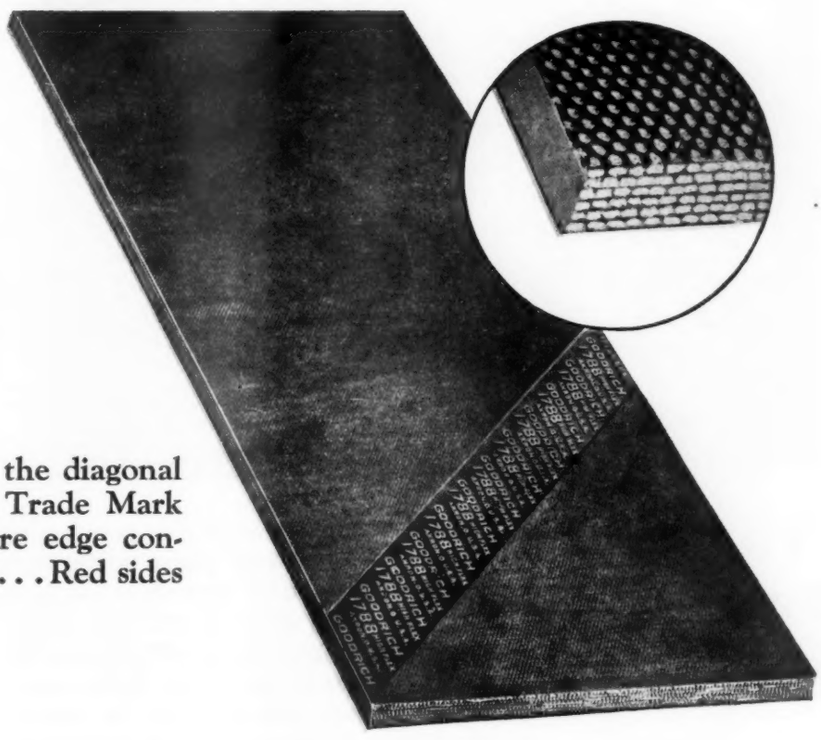
16-b. One size of guy wire is recommended; namely, three-eighths inch.

Section 11—Inspection and Rejection

17-a. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacture of the material ordered hereunder. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him

(Continued on Page 237)

Goodrich



Look for the diagonal Red Bar Trade Mark . . . Square edge construction . . . Red sides

"1788 Highflex"

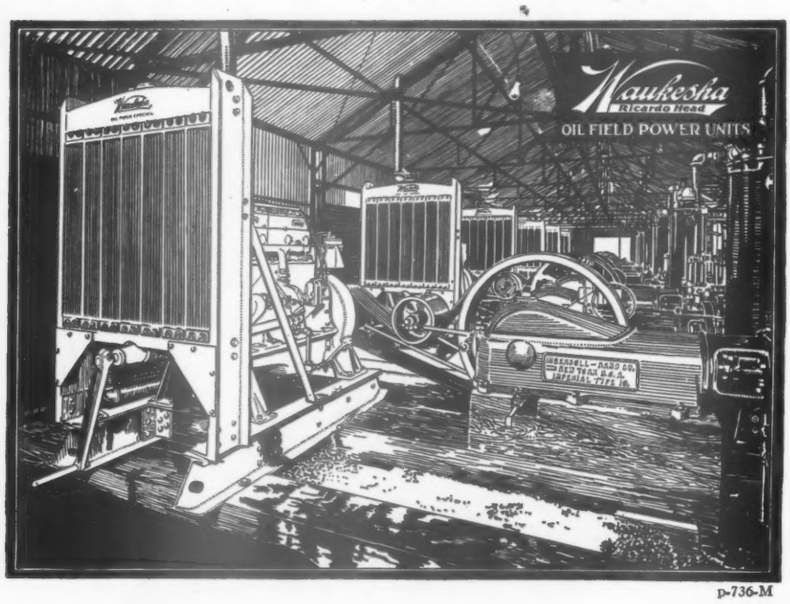
Transmission Belting

Made Especially for Oil Field Service

THE B. F. GOODRICH RUBBER COMPANY

Established 1870 Akron, Ohio

Waukesha Driven Gas Lift Plant at Bowlegs, Oklahoma



p-736-M

Turning Waste Into Gain

7,500,000 cubic feet of gas per day is the capacity of this plant—sufficient to lift 5000 or more barrels of oil and serve as many as 17 wells. 125 H. P. Waukesha "Ricardo Head" Engines of the heavy duty Oil Field Type, running on waste gas, furnish the power necessary to operate these Ingersoll-Rand Imperial Type 10 Compressors.

These Waukesha heavy duty four-cylinder engines are built especially for this compressor drive service. 80-100 and 125 H. P. are the sizes available. They have unusually large radiators to provide adequate cooling under Oklahoma, Texas and Venezuela temperatures, even when enclosed in a house as shown above. Portable Oil Field Units are also available for driving oil, water and mud pumps, also rotary or cable drilling rigs. Write for our "Gas Lift" book if you do not have a copy.

P-761-L

OIL INDUSTRY EQUIPMENT DIVISION

WAUKESHA MOTOR COMPANY

Waukesha Wisconsin

New York	Kansas City	Denver	Tulsa	Houston	San Francisco
8 W. 40th St.	V. L. Phillips Co.	Wilson Machy. Co.	C. F. Camp Co.	Portable Rotary Rig Co.	C. A. Watts

Exclusive Builders of Heavy Duty Gasoline Engines for Over Twenty Years

Standard Steel Tanks for Oil Storage

Fall Into Two General Classes. Essential Specifications Have Been Agreed Upon by A. P. I. Committee

By Ralph J. Reed and Mark W. Daw

National Chairman and National Secretary, A.P.I. Special Committee on Standardization of Steel Tanks for Oil Storage.

Steel tanks used for oil storage fall into two general classes—the familiar lightweight sectional bolted tanks used in large numbers in the field for receiving production and often for storing it, and the heavier riveted steel tanks generally used for permanent storage. The A.P.I. Special Committee on Standardization of Steel Tanks for Oil Storage has undertaken the task of preparing standards for both types of steel storage tanks and has progressed to the point where the essential specifications for their construction have been agreed upon, though A.P.I. standard tanks are not yet available for

RALPH J. REED

distribution. The committee was not organized until some time after the other standardization committees were at work; and in common with them has found it

WILLIAM A. KNAPP
Steel Storage Tanks.

necessary to pass through an extended period of investigation and study before necessary data could be obtained and analyzed and opinions begin to crystalize.

Bolted Tanks

Study of the bolted tanks supplied to the industry by the leading manufacturers revealed the fact that though there is a wide range of sizes and capacities, there is considerable uniformity in methods of construction and in weights of material used; and not a large variation in the over-all dimensions of the stave in general use. It appeared possible without serious hardship to the manufacturer and with decided benefit to the user to standardize the size of stave and the type of bolted joint. Investigation of the needs of the industry indicated that few standard sizes will meet the bulk of field requirements. With the hearty co-operation of the manufacturers of bolted tanks there has, therefore, been drawn up a tentative standard specification for tanks of the following capacities in barrels: 100, 200, 250, 500, 1,000 2,000, 5,000 and 10,000.

As will be noted from the dimensional table following, eight different capacities are obtained using but six different tank diameters, and it is possible in the case of the 500-bbl. and 1,000-bbl. tanks to choose either a single-course or a double-course shell, with heights respectively of 8 feet or 16 feet.

DIMENSIONS OF STANDARD A.P.I. BOLTED TANKS
(Tentative)

Nominal Capacity Bbls.	Diameter	Height
100	9′-2⅜″	8′-0½″
200	9′-2⅜″	16′-1 ″
250	15′-4½″	8′-0½″
500	15′-4½″	16′-1 ″
500	21′-6 ″	8′-0½″
1,000	21′-6 ″	16′-1 ″
1,000	29′-8½″	8′-0½″
2,000	29′-8½″	16′-1 ″
5,000	38′-7½″	24′-1½″
10,000	55′-	24′-1½″

All bolts to have 2-inch pitch with 2 inches between rows, center to center.

Double-bolted seams to be square pattern. Water seal roofs to be figured for 9 inches of water. Cone roofs to have a pitch of 1 inch in 12 inches. Standard sheets to be 60 inches by 100 inches.

Riveted Tanks

The problem of standardizing riveted tanks presented at the outset many difficulties, and after considerable discussion it was agreed in the beginning that maximum benefit to both oil indutsry and tank manufacturers would result by working along the following general lines:

1. Adopt the minimum number of tank sizes which will adequately meet the industry's requirements.

2. Adopt a uniform size of plate, and then lay out designs for the various sizes so that a minimum number of plate thicknesses will be required to build all sizes.

In the actual work of preparing the standards it proved desirable to adopt a standard plate size first. This selection was guided largely by the recommendations of tank manufacturers—since it has been the purpose of the committee throughout its work to design a series of tanks that would be economical both to fabricate and to erect in the field. A plate width of 72 inches was chosen because it is now used in many shops, is a common width of plate carried in stock by jobbers, and is the widest plate in which three-sixteenths-inch or one-quarter-inch thicknesses can be bought at base price. With a view to minimizing the number of vertical joints it was agreed that the longest plate which could be economically handled by the usual field erection equipment should be used. This was reported by the manufacturers to be in the neighborhood of 18 to 20 feet. The length finally adopted was approximately 19 feet; this length is 6 by 3.1416 (plus a small allowance for lap) so that the diameters of tanks built with these plate will vary by even multiples of 6 feet.

With the size of plate decided it was agreed that the industry's requirements for storage tanks could be readily met with a series of tanks of seven diameters ranging from 36 to 144 feet, as shown in the following table:

SCHEDULE OF APPROXIMATE DIMENSIONS AND DIAMETERS
for
A.P.I. Standard Tanks
Capacities in 42 Gallon Barrels

Diam.	23′6″ Hgt.	29′6″ Hgt.	35′	41′	47′
36′	4,400	5,500	6,500	7,600	.....
48′	7,300	9,400	11,000	13,000	.....
60′	....	15,000	18,000	21,000	.....
78′	....	25,000	30,000	35,000	.....
102′	....	43,000	51,000	60,000	.....
120′	....	59,000	70,000	82,000	94,000
144′	....	85,000	103,000	120,000	138,000

As the tendency of the industry is to build higher tanks than have been in common use in the past, it is proposed to

CHARLES FITZGERALD
National Secretary, Committee on Oil Country Tubular Goods and Member Steel Storage Committee.

proceed to prepare detailed designs for the highest tanks listed in this table, that is, eight rings high in the two

A. A. KRAMER
Steel Storage Tanks.

larger diameters, and seven rings in the other five. Lower tanks of any standard diameter can of course be built from the standard designs by simply omitting one or more of the lower rings. With this arrangement, it will be possible to get, with only the seven standard diameters, a range of sizes varying by small increments from 4,400 bbls. to 138,000 bbls., and the tentative lay-outs for these seven diameters indicate that this complete range of sizes can be built with only 15 different thicknesses of plate. Tanks most frequently built, ranging in capacity from 82,000 bbls. downward can be built with only 10 thicknesses of plate—so that this comparatively small stock should meet a large part of the industry's requirements.

Advantages Gained

Thus the adoption of the recommended standard tank designs will bring the same advantages that result in other lines from efforts toward standardization—or "simplification," as Secretary Hoover chooses to call it. In addition to minimizing the plate stock required, as described above, the existence of detailed standard designs will greatly simplify the process of ordering tanks. It will not be necessary for the purchaser asking for proposals for "A.P.I. standard tanks" to prepare his own detailed plans, or check those submitted by the bidders. As the manufacturer will know definitely what is required of him he can prepare his bids quickly. His success in securing the order will then depend entirely upon price, workmanship and time of delivery, rather than the possibility of having a competitor persuade the customer to accept an inferior tank at a lower price.

All of these advantages are sure to enable the user to save money on his tank construction and at the same time allow a satisfactory profit to the builder. Knowing that the majority of customers will buy tanks of the same design the shops can fabricate parts during dull periods and be assured of a sale when the demand increases. Labor-saving machinery can be installed without the necessity of reseting to meet the whims of each buyer. Stocks of steel can be reduced and when the shop must go beyond its own stock it will be easier to secure plates that will fit.

The preparation of specifications and designs for standard tanks, like those for other equipment, has required much hard work and patience. There were honest differences of opinion and practice to be analyzed and reconciled; and there were many problems to be investigated. Extensive searching has revealed but little data that could be used with assurance of its accuracy. The committee has therefore been guided largely by precedent and experience and this information is now being supplemented by a series of strain gauge tests on working tanks, from which it is expected that valuable data will be secured.

Cost Considered

The structural design of a safe tank would not present a complicated problem if its cost could be forgotten. But while safety is of paramount importance and must not be neglected, the cost of a standard tank must be kept reasonably close to that of the average present-day commercial tank. The problem, therefore, has been not only to decide how strong a tank must be to provide safe storage, but to avoid excess strength that could not be justified by theoretical considerations or past experience, and consequently to avoid extra cost.

Common practice in the building of oil tanks has been to specify a safety factor of 2.5; it has seemed, however, to be better practice to follow ordinary structural design procedure in specifying ultimate strength of steel, unit stresses to be used in design, and a uniform method of computing stresses. After definite

Made to

GUIBE

Conform to—
A.P.I.
STANDARDS

The Guiberson Corporation appreciates the great work the A.P.I. Standardization Committees are doing to effect savings both to the manufacturers and to the users of oil field equipment. The Guiberson plant is equipped with gauges, dies and taps made to A.P.I. standards.

GUIBERSON UNDERREAMERS have Cable Tool Joint threads made to A.P.I. Gauges. Underreamer Cutters are made to work inside of all A.P.I. standard casing dimensions.

GUIBERSON TUBING CATCHERS have tubing threads made to A.P.I. Gauges. We are now prepared to make our Tubing Catcher heads for all sizes of A.P.I. Casing.

GUIBERSON TYPE "E" SWABS have Cable Tool Joint threads made to A.P.I. standard gauges. Our swab cups are made to run in any size A.P.I. casing.

"Better Be Safe Than Sorry"

THE GUIBERSON CORPORATION

Box 1106, Dallas, Texas

CALIFORNIA BRANCH: 1506 Santa Fe Ave., Los Angeles

402 W. First St., TULSA
321 S. Osage St., PONCA CITY
506 Trust Bldg., NEWARK, O.

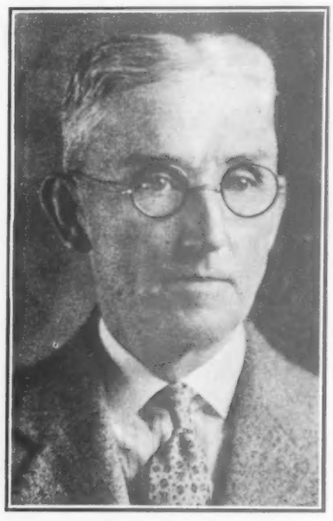
methods of computation were agreed upon the committee turned to the discussion of the unit stresses that should be allowed in the shell plates. It was in this part of the work that the absence of technical data was most keenly felt. The records of a number of large producers were searched without results for data regarding tank failures that would furnish a basis for decision. Any contribution of actual data regarding the failure of tank shells will be appreciated by the committee now, and will be a valuable help, whether it supports the specifications as tentatively adopted, or proves that they should be modified.

Designs Compared

Upon comparing the designs of tanks built by some of the large users with those regularly sold by manufacturers one fact stood out; the tanks designed and built by the oil companies were almost invariably stronger and heavier than those built by the manufacturer to meet

WALTER SAMANS
Steel Storage Tanks.

competition. For this reason, the maximum allowable working stresses finally agreed upon provide a factor of safety slightly greater than 2.5 and tanks built to the tentative A.P.I. specifications will be a little stronger than the average manufacturer's standard tank now being sold. However, by carefully designing the joints so that the tensile and shear-



D. L. JOLLY
Steel Storage Tanks.

ing stresses are evenly balanced the increase in weight has been slight.

The tentative general specifications adopted at Colorado Springs represent the almost unanimous opinion of engineers and manufacturers with wide experience in tank building and may be accepted with full confidence by the industry. They are comprehensive enough to be used for tank construction, but the real benefits of standardization will not be realized until the detailed designs are completed. The special committee is working upon these designs, and plans to present them at the institute's annual meeting this coming December in Chicago. With the tentative general specifications formally approved by the general committee on standardization and by the board of directors of the institute and with the detailed designs at hand it is confidently expected that "A.P.I. standard tanks" will be available to the industry in 1928.

GENERAL SPECIFICATIONS FOR STEEL STORAGE TANKS (TENTATIVE)

SECTION 1—MATERIAL

(1-a) The various materials used shall conform in chemical and physical properties to the specifications noted below.

(1-b) Plates—Either Class "A" American Steel Manufacturers, or Current A. S. T. M. A-7, or Current A. S. T. M. A-9.

(1-c) Copper-bearing steel may be used for roof plates if so specified by the purchasers.

(1-d) Plate specification by weight is recommended, and plates purchased on weight specification shall individually comply with the normal tolerances as they appear in these specifications.

(1-e) Structural Steel—Current A. S. T. M. A-9.

(1-f) Rivets for Hot Driving—Either current A. S. T. M. A-7, or current A. S. T. M. A-31, or A. S. M. E. Boiler Code.

(1-g) Rivets for Cold Driving—Rivets conforming to either of the above specifications, annealed.

SECTION 2—SHELL DESIGN

Loads and Working Stresses

(2-a) Stresses are to be computed on the assumption that the tank is filled level full of water at 60 degrees Fahrenheit, and the tension in each ring is to be computed 12 inches above the bottom gauge line of the ring in question.

(2-b) In figuring net section of plate, rivet holes are to be assumed one-eighth-inch larger in diameter than the nominal diameter of the rivet; and in figuring net section of rivet, the nominal diameter of the rivet plus one-sixteenth of an inch is to be used.

(2-c) The following maximum allowable working stresses shall be used in design:

Maximum tensile stress in net section of plate, 21,000 pounds per square inch.

Maximum shear in net section of rivet, 16,000 pounds per square inch.

Maximum bearing stress on plates or rivets: 35,000 pounds per square inch when rivets are in double shear; 32,000 pounds per square inch when rivets are in single shear.

Sizes of Plate and Tank

(2-d) Tanks shall be designed so that the diameter is a multiple of 6 feet, using shell plates having a net length (total length minus lap) of 6xpi (3.1416). The number of plates in each course will thus be equal to the diameter of the tank divided by six. Shell plates shall have an over-all width of 72 inches.

Note: The following table shows the range of capacities that can be obtained with plates of the size above specified, using only seven different diameters, and varying heights:

SCHEDULE OF APPROXIMATE DIMENSIONS AND DIAMETERS
for A.P.I. Standard Tanks
Capacities in 42-gallon Barrels

	Height				
Dia.	23'6	29'6	35'	41'*	47'
36'	4400	5500	6500	7600	
48'	7300	9400	11000	13000	
60'	15000	18000	21000		
78'	25000	30000	35000		
102'	43000	51000	60000		
120'	59000	70000	82000	94000	
144'	85000	103000	120000	138000	

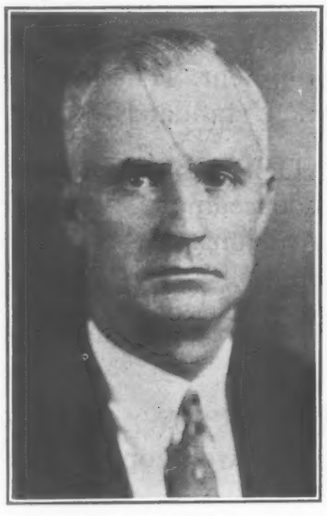
*Detailed designs for standard tanks of the approximate dimensions and capacities shown in this column are being prepared by the special committee.

(2-e) The minimum thickness of shell plates shall be one-fourth of an inch in tanks over 48 feet in diameter; and shall be three-sixteenths inches in tanks 48 feet or less in diameter.

(2-f) Tanks shall be designated with vertical rings so that all plates will be truly rectangular. In tanks six rings high or less each ring shall be inside the one beneath it; in seven-ring tanks the second ring shall be outside the first and each ring above the second shall be inside the one beneath it; and in eight-ring tanks the second ring shall be inside the first, the third ring outside the second, and each ring above the third inside the one beneath it.

Riveting and Caulking

(2-g) Rivet holes in plates five-eighths-inch or under shall be punched or drilled one-sixteenth of an inch larger than nominal diameter of rivets. In plates heavier than five-eighths of an inch, rivet holes shall be either drilled, or subpunched and reamed to a diameter one-sixteenth-inch greater than nominal diam-



W. H. DWYER
Steel Storage.

eter of rivet. To insure full rivet section, equal to computed area, all holes in shell plates shall be reamed after bolting up, using a reamer one-sixteenth-inch greater in diameter than the nominal diameter of the rivet.*

(*Note: Holes properly punched and matched will not require the removal of any metal by the reamer, but the tool must be inserted in each hole as a gauge.)

(2-h) Caulking edges of plates less than one-half-inch in thickness shall be beveled by shearing or planing, the angle of bevel to be not less than 65 degrees nor more than 75 degrees. On plates one-half-inch thick, the edges shall be trued by either square shearing or planing, or bevel shearing or planing.

(2-j) The distance between the gauge line of the outer row of rivets and the edge of the plate to be beveled shall be not less than 1½ times the nominal rivet diameter plus the thickness of the plate. After beveling, the distance from the gauge line to the nearest edge of the bevel shall be not less than 1½ nor more than 1¾ times the nominal rivet diameter. The distance between the gauge lines and the edge of a plate not to be caulked shall not be less than 1½ times the nominal rivet diameter.

(2-k) Unless otherwise limited by considerations of stress, the minimum distance between centers of rivet holes shall be three times the nominal diameter of the rivet, and the maximum distance shall be seven times the thickness of the plate, plus the nominal diameter of the rivet.

(2-m) The distance between the center lines or any two adjacent rows of rivets, or the "back pitch" measured at right angles to the direction of the joint, shall have the following minimum values:

(a) If P/d is 4 or less, the minimum value shall be (2 d);

(b) If P/d is over 4, the minimum value shall be (2 d) plus (0.1) (P—4d) where

"P" equals pitch of rivets in outer row where a rivet in the inner row comes

J. A. WOLFE
Oil Field Boilers, Belting, Steel Storage, Pumping Equipment and Engines.

midway between two rivets in the outer row, inches.

"P" equals pitch of rivets in the outer row less pitch of rivets in the inner row where two rivets in the inner row come between two rivets in the outer row, inches.

(It is here assumed that the joints are of usual construction where the rivets are symmetrically spaced.)

"d" equals diameter of the rivet holes, inches.

The back pitch of rivets shall be measured either on the flat plate before rolling, or on the median line after rolling.

(Note: The above rules for back pitch are copied from paragraph P-182 of the A. S. M. E. Boiler Construction Code, edition of 1924.)

(2-n) The following combinations of rivet sizes and plate thickness shall be used:

3/16" plate—7/16" rivets
1/4" plate—5/8" rivets
5/16" plate—5/8" rivets
3/8" plate—3/4" rivets
7/16" plate—3/4" rivets
1/2" to and incl. 5/8" plate—7/8" rivets.

In round-about seams the same size of rivet shall be used as used in the ring above.

(2-p) Rivets 5/8" in diameter and over shall be driven with steeple heads.

(2-q) The top angle shall be placed on the inside of the shell.

(2-r) Shell and bottom shall be caulked to bottom angle from the outside only.

SECTION 3—ROOF DESIGN

(3-a) Conical steel roof and supporting structure shall be designed to carry a live load of 25 pounds per square foot in addition to the dead load, and the supporting structure shall be designed in accordance with current American Institute of Steel Construction standard specifications for the design, fabrication and erection of structural steel for buildings, except that the value of L/R shall not exceed 180. Structural shapes shall be used for roof columns. The slope of the roof shall be one-half-inch in 12 inches.

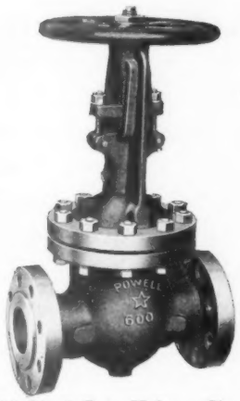
(3-b) Roof plates shall be three-sixteenths-inch thick, 72 inches wide and shall have the same approximate length as three-sixteenths-inch shell plates. They may be either riveted or welded; if riveted, rivets shall be seven-sixteenths to 1½-inch pitch.

(3-c) Rafters are to be spaced so that in the outer row there shall be three

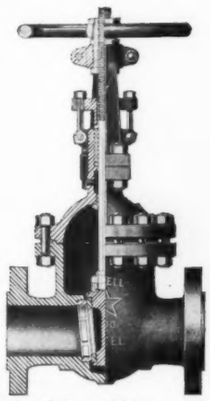
(Continued on Page 296)

LET POWELL VALVES SOLVE THOSE VALVE PROBLEMS

Install a proven product! While years of meritorious service to the engineering field have meant much in the increase of production, we have progressed more in betterment of product.



Series 600 Steel Gate Valve. Sizes 1½ to 24 inch. 600 pounds W. S. P. at 750° F. total temperature.



Series 400 Steel Gate Valve. Sizes 4 to 24 inch. 400 pounds W. S. P. at 750° F. total temperature.

Series 300 Steel Globe Valve. Sizes 2 to 10 inch. 300 pounds W. S. P. at 750° F. total temperature.

See our Exhibit at the International Petroleum Exposition
Tulsa, Oklahoma, Sept. 24 to Oct. 1.
Booths 126-127

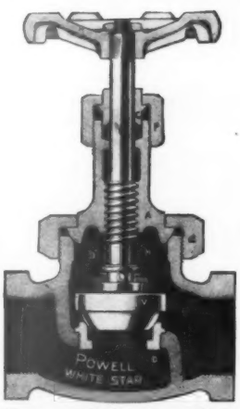


Fig. 102 Bronze White Star Globe Valve. Sizes ¼ to 3 inch. 200 pounds, Extra Heavy for 300 pounds W. S. P.

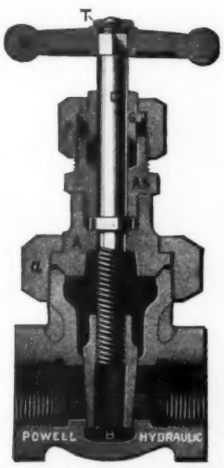


Fig. 178 Bronze Hydraulic Gate Valve. Sizes ¼ to 3 inch. 2000 pounds W. W. P.

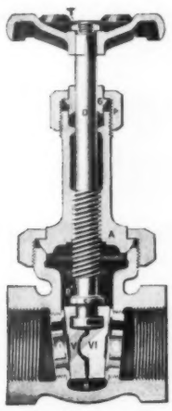


Fig. 1375 Bronze White Star Gate Valve. Sizes ¼ to 3 inch. 200 pounds, Extra Heavy for 300 pounds W. S. P.

We manufacture a complete line of valves and engineering appliances especially adapted to Oil and Gas Well, and Field and Refinery Service.

Bronze, Iron and Steel Globe, Angle, Cross, Check, Gate and Safety Valves in standard sizes and pressures; also lubricators, oilers, grease cups, whistles, expansion joints, swivel fittings, etc.

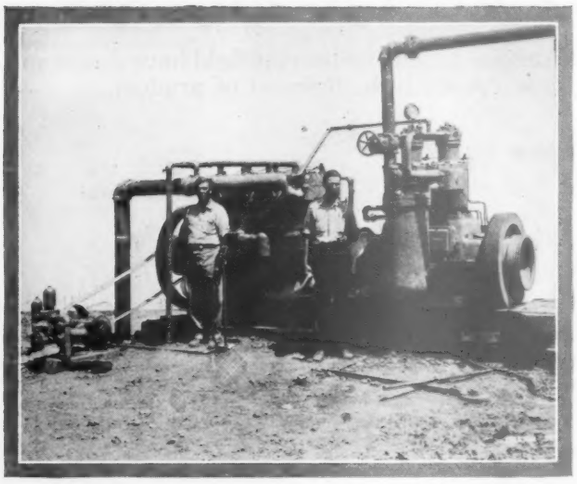
Distributors with stocks in all principal oil centers.

THE WM. POWELL CO.

2521-2531 Spring Grove Ave. Cincinnati, Ohio

SEVEN CLARK VER

in a single Mid-Continent



The Tidal-Osage Oil Company installed 7 Clark vertical compressors in their Shidler, Oklahoma, booster station for a unique purpose. When the wet gas, which they sell to another Mid-Continent manufacturer, has been denuded of its gasoline content, the dry gas is returned to the Tidal booster station pictured opposite and is pumped back 9 miles into old wells, where it is stored for future use.

The Clark vertical is *quickly set up* at the well location, a *Big* advantage in properly applying air and gas to flowing wells, as authorities on this method emphasize the importance of putting on pressure while the well is sufficiently headed. The vertical is ruggedly built, and therefore dependable for continuous operation over a long period. The engine driving the compressor is the same as required for foundations. See this new compressor, as well as other recent Clark developments, at the Petroleum Exposition, where they will be shown on lot A. Clark Bros. Co., Olean, N. Y. Mid-Continent branch and warehouse at 125 W. First St., Tulsa, Okla. Other warehouses at McCamey and Sweetwater, Texas, and Artesia, N. M. Also Smith, Booth, Usher Company, 228 S. Central Ave., Los Angeles and 50 Fremont St., San Francisco.

The CLARK exhibit at the Petroleum Exposition offers an opportunity to study at first hand the following CLARK products:

CLARK

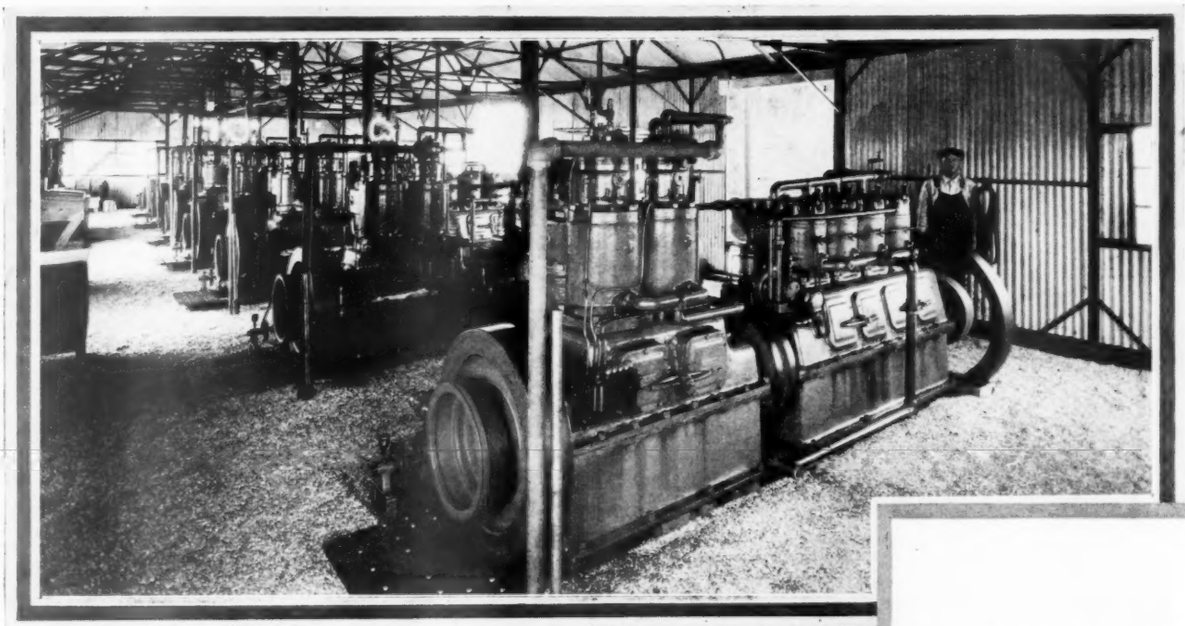
COMPRESSORS
DRILLING ENGINES
PUMPING ENGINES

'BE SURE TO SEE THEM'

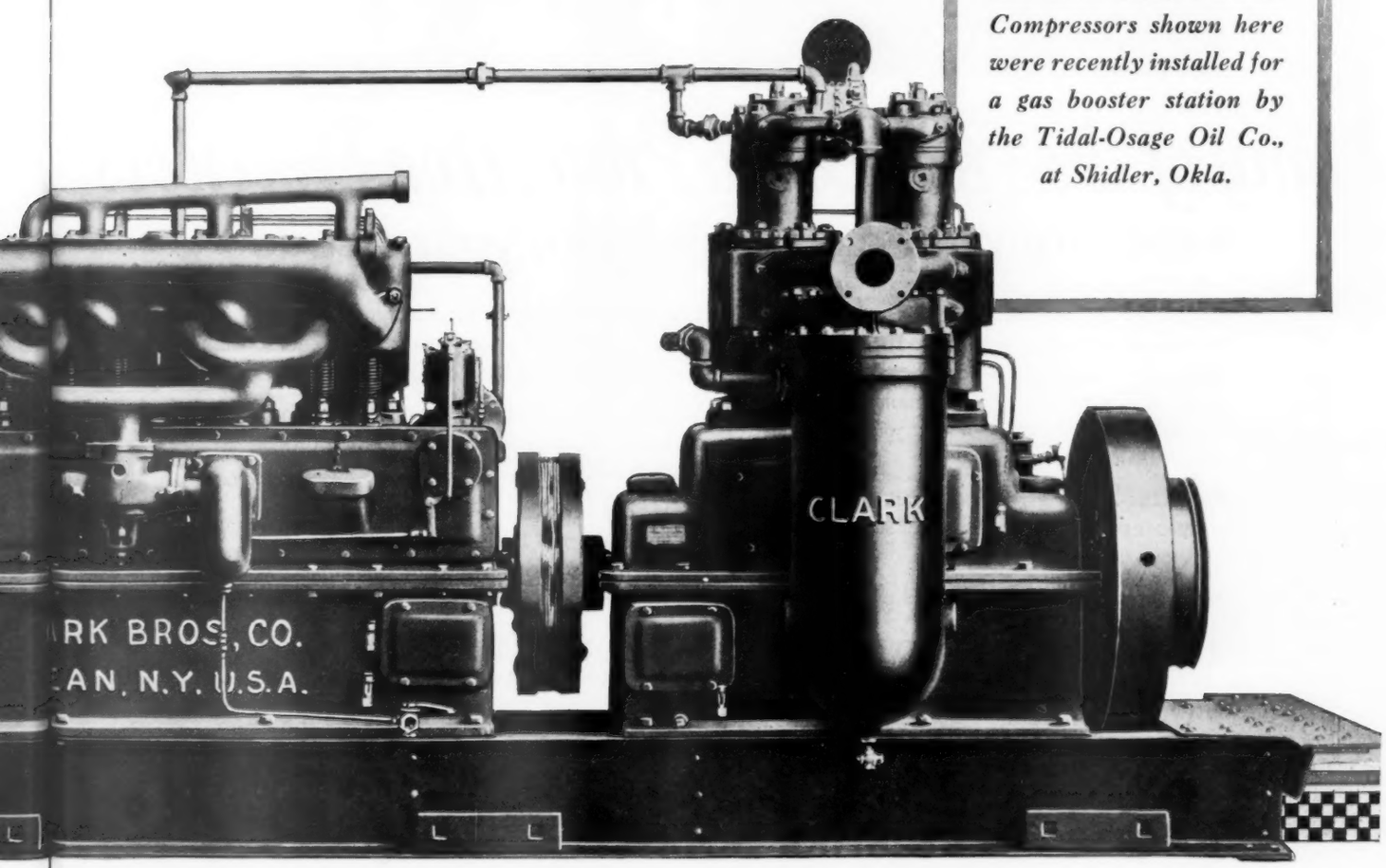
Clark Bros. Co. OLEAN, N.Y.

RTICAL COMPRESSORS

nt Installation



The seven Clark Vertical Compressors shown here were recently installed for a gas booster station by the Tidal-Osage Oil Co., at Shidler, Okla.



Many of the 6,819 Arco Protective Products
were formulated especially for your needs

Remember this . . . we kept constantly in mind the severe conditions peculiar to the oil and gas industries when many of the 6,819 Arco protective products were formulated. *These specific paints were made to meet your particular requirements.*

For example . . . Arco Tank Paints provide a permanent rust-resisting finish for storage tanks, tank cars, auto tank trucks, etc.

Arco Pipecote is a heavy-bodied paint that insulates perfectly against the damaging effects of moisture, alkalis and acids. It settles the question of pipe line protection once . . . for all time.

And there are hundreds of other Arco products. Each one is made to do one job . . . and do that *one job well.*

Tell us your problems. We'll be glad to make recommendations. Feel free to write us at any time. Why not today . . . while this subject is fresh in mind?

THE ARCO COMPANY · CLEVELAND, OHIO
PAINTS · VARNISHES · ENAMELS · LACQUERS (67)

ARCO

PAINTS VARNISHES ENAMELS LACQUERS

Rotary Drilling Accomplishments

Work of Committee Has Progressed to Point Where Concrete Results Can Be Visualized

By R. A. Wilson,
National Secretary, Committee on Standardization of Rotary Drilling Equipment.

The work of the special American Petroleum Institute committee on the standardization of rotary drilling equipment has now progressed to the point where concrete results can be visualized. This committee, being very representative of operators and manufacturers who have co-operated in a generous and wholehearted spirit, has been in existence for four years and during that period has carefully analyzed and adopted standards on such parts of rotary drilling equipment as was deemed advisable, bearing in mind that there was no desire in any way to interfere with the progress of invention or private initiative.

The first work of the committee was to make a very careful survey of existing conditions and equipment. It showed an almost endless variety of types and sizes, particularly on taper joints for rotary drilling.

As the work progressed it was subdivided into certain natural divisions as follows:

1. Taper joints for rotary drilling extending from the swivel to the fish tail bit.
2. Drill pipe.
3. Basic transmission equipment, including shafting, key and keyways, chain and sprocket tooth form.
4. Line shafts for rotary drawworks.
5. Miscellaneous standards, including methods of measurement, standard tapers for backs of rotary slips, etc.

Principal Accomplishments

We show below some of the principal accomplishments to date.

The standardization of all threaded connections from swivel to fishtail bit is the outstanding accomplishment of this committee. This includes swivel and grief stem connections, tool joints, drill pipe, collars, drill collars and fish tail bits.

When it is borne in mind that practically 70 per cent of the drilling done in this country today is by the rotary method and that its use is being rapidly extended, the effect of this standardization can be visualized.

Figure 1 illustrates the American Petroleum Institute Rotary Standard Drill Stem.

One of the first standards completed was drill pipe, which includes the quality of material, type of thread and sizes, both pipe and couplings, also gauges and gauging practice.

Concurrently with the formulation of drill pipe standards this committee was working on the details of standard taper joints. An analysis of one district alone showed over 28 different sizes of fish tail bit shanks for 4-inch drill pipe. Assuming this condition obtained in other districts, it is plainly evident there was great need for simplification and standardization as was apparent to both operators and manufacturers.

Not an Easy Task

The establishing of standards for rotary drilling taper joints was not an easy task. The preliminary reports of this committee recommended a form of thread on which extensive and exhaustive field tests were made. It is a safe estimate to say that at least $75,000 was spent by the industry in testing out recommended sizes and kinds of taper joints. These tests were conducted in every oil producing district in the United States where the rotary was used—California, Oklahoma, Texas and Louisiana, and all leading authorities on threads were consulted. As a result, the present American Petroleum Institute standards were finally adopted.

In addition to standardizing the taper joint, the other principal dimensions of the material used in the rotary drill stem were also standardized. For example, the outside diameter and length of tool joints

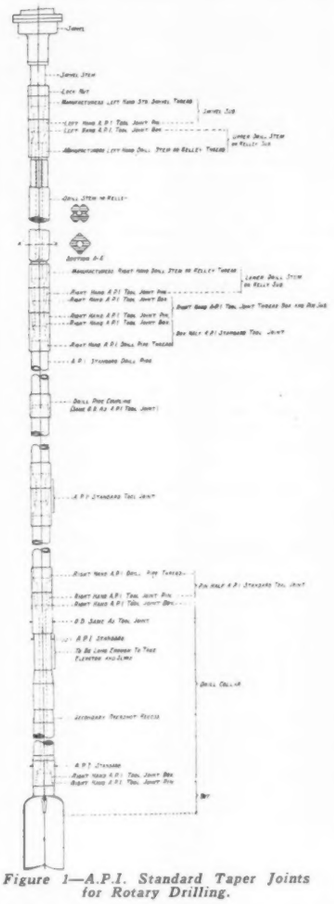


Figure 1—A.P.I. Standard Taper Joints for Rotary Drilling.

and drill collars were completely covered. The same applies to the grief stem couplings, both above and below the rotary table. There is one standard size taper joint for each size drill pipe which extends from the bottom grief stem coupling to the fish tail bit and includes the tool joints and drill collars.

Effect of Standardization

The effect of this standardization of the rotary drill stem means that we have today seven standard taper joints, where formerly there were possibly several hundred in existence in the various fields. It means that when an operator orders a tool joint or a coupling, or drill collar, or fish tail bit to be used with the standard size drill stem, he knows that there is but one standard taper joint for that size drill pipe. To the manufacturer it means that eventually he will not be subject to the demands for ten or fifteen different sizes of taper joint; for example, on fishtail bits—in the past, it has been necessary for the various manufacturers to carry any number of gauges in order to take care of demands from the different fields. Under the American Petroleum Institute standards, this is reduced to one gauge only for each size drill pipe, or seven in all for the joints used below the rotary table.

A group order is now being assembled for the purchase of the necessary "master" gauges and every manufacturer and operator who turns his own joints should place his order now so that they may be

R. A. WILSON

included and get the benefit of the group order prices. Details of this group order can be obtained from the American Petroleum Institute division of standardization, 1508 Kirby Building, Dallas, Tex.

Economies Effected

The economies to be effected by the introduction of American Petroleum Institute standards for taper joints for rotary drilling can only be computed in millions of dollars to the operator and manufacturer alike. It also means:

1. Reduction in warehouse stocks of both manufacturer and operator.
2. Elimination of mistakes in placing orders.
3. Interchangeability of materials between various manufacturers.

It means that a purchaser may order a swivel from one manufacturer, a grief stem from another, tool joints from another, the drill collar from another and fish tail bits from still another, and this entire string should be safely screwed together and used.

A.P.I. Transmission Standards

The four main elements in this classification on which standards have been formulated and adopted are:

1. Standard sizes of shafting.
2. Standard sizes of keys.
3. Standard sizes of chain.
4. Standard sprocket tooth form.

The survey of existing equipment made by this committee showed a great variety of shafting aind keys used. It was not an uncommon experience to find variations of one-sixteenth to one-eighth inch, etc., in sizes of shafting that were used for substantially the same purpose. To overcome this condition this committee has eliminated the one-sixteenth inch sizes of shaft diameters one-half inch to four inch, the one-sixteenth and one-eighth-inch sizes from 4¾-inch to 6-inch, and the one-sixteenth, one-eighth and one-fourth inch sizes over 6 inch. This eliminates the practice sometimes used on a shaft that was commonly called 4 inch, but might be 3 1/8-inch, 4-inch or 4 1/16-inch. The American Petroleum Institute standard in this group would be even 4 inch.

The basic sizes of shafting and keys adopted were selected from the basic national standards established by the American Engineering standards committing under the sponsorship of the American Society of Mechanical Engineers therefore, all American Petroleum Institute standards are in accordance with national standards and should in no way complicate the source of supply of materials.

The following illustration and table illustrates the application of the American Petroleum Institute standards as applied to rotary line shafts:

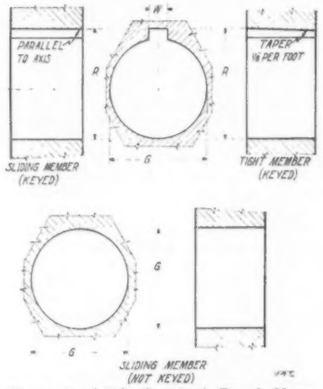


Figure 2—A.P.I. Standard Bored Members Rotary Line Shafts.

In addition to the foregoing the follow-

TABLE 3
DETAILS OF BORED MEMBERS FOR A.P.I. STANDARD ROTARY LINE SHAFTS
See Figure 2. All dimensions in inches at 68 degrees Fahrenheit

Member—	Diameter of Bore: Nominal	Diameter of Bore: "G" Actual	Diameter of Bore: Tolerance	Type of Key	Nominal Size of Key	Keyway*: "W"	Keyway*: Width Tolerance	Keyway*: Diameter of Bore to Bottom of Keyway "R"	Keyway*: Tolerance
Tight Members, keyed	4	4.000	+.002 —.000	Taper	1 x ¾	1.000	+.003 —.000	4.3580	+.006 —.000
Sliding Members, keyed	4	4.015	+.005 —.000	Feather	1 x1	1.015	+.010 —.000	4.4680	+.006 —.000
Sliding Members, not keyed	4	4.005	+.003 —.000	.....	.....	....	...	.....	...
Tight Members, keyed	5	5.000	+.002 —.000	Taper	1¼x ⅞	1.250	+.003 —.000	5.4205	+.006 —.000
Sliding Members, keyed	5	5.015	+.005 —.000	Feather	1¼x1¼	1.265	+.010 —.000	5.5310	+.006 —.000
Sliding Members, not keyed	5	5.005	+.003 —.000	.....	.....	....	...	.....	...
Tight Members, keyed	6	6.000	+.002 —.000	Taper	1½x1	1.500	+.003 —.000	6.4830	+.006 —.000
Sliding Members, keyed	6	6.015	+.005 —.000	Feather	1½x1½	1.515	+.010 —.000	6.6560	+.006 —.000
Sliding Members, not keyed	6	6.005	+.003 —.000	.....	.....	....	...	.....	...

*Note—All keyways shall be cut on a diametral center line.

ing illustration and formula illustrates the manner in which the projection of the key on new material is kept within established distances:

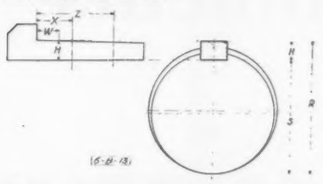


Figure 3—A.P.I. Standard Rig Irons, Projection of Taper Key Under Maximum and Minimum Tolerances.

Projection of Taper Keys Under Maximum and Minimum Tolerances

The numerical values of "R" and "S" are computed as follows:

R=(T+H/2—.017) $^{+.006''}_{-.000''}$

S=(T—H/2)$^{+.000''}_{-.006''}$

Where

R=The diameter of the bore to the bottom of keyway, in inches;

S=The diameter of shaft to the bottom of keyway, in inches;

T=Nominal diameter of shaft, in inches.

The reason for deducting .017 inch from the nominal depth of the keyway in the bored member is to establish the minimum projection of the key greater than "W."

A difference of .001 inch in "H" is equivalent to a movement of .096 inch measured parallel to the base of the key from "W."

W=The distance from the gib-head at which the values for "H" are computed.

X=Minimum projection of key with keyways ("R" minus "S") at maximum depth and height of key ("H") at minimum.

Z=Maximum projection of key with keyways ("R" minus "S") at minimum and height of key ("H") at maximum.

Examples: Positions of 1"x¾" key in 4" shaft.

Minimum Projection "X"

"W"=1"

"H"=.750" =.750"

"R" Minus "S"=4.364"—3.619" =.745"

Difference =.005"

Whence (5) (0.096)=.480", therefore projection "X" equals "W" plus .480" or 1.480".

Maximum Projection "Z"

W=1"

H=0.750"+.003" =.753"

"R" Minus "S"=4.358"—3.625" =.733"

Difference =.020"

Whence (20) (.096)=1.920", therefore projection "Z" equals "W" plus 1.920" or 2.920".

Standard sizes on chain have been adopted as well as an official American Petroleum Institute numbering system. The following illustration and table give the essential dimensions that have been adopted:

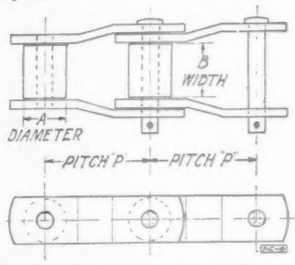


Figure 4—A.P.I. Standard Sprocket Chain, Pitch and Roller Dimensions.

TABLE 4
ROLLER DIMENSIONS FOR A.P.I. STANDARD CHAIN
See Figure 4
All Dimensions in Inches

A.P.I. Chain No.	Old Numbers	Pitch "P"	Roller Diameter "A"	Roller Width "B"
3	1030 SS-40	3.075	1¼	1 7/16
3½	1135 1240	3.500	1⅝	1 7/16
4	SS-124	4.063	1⅝	1⅝

A special form of sprocket tooth has also been adopted as well as definite methods for measuring hoisting blocks, casing hooks, standard taper for rotary spiders, as well as standard threads for overshot bowls.

The standards which we have attempted to describe in the foregoing and which are also printed in detail hereinafter, do not, in my judgment in any way interfere with special designs of any character. An analysis will show that these standards have been adopted only in such points and places as where one piece of equipment comes in contact with another. Is there, therefore, any reason why these standards should not be universally adopted by the operators and manufacturers? In my opinion, there is no logical argument against the adoption and use of proper standards on the items of equipment herein mentioned.

A. P. I. SPECIFICATIONS FOR TRANSMISSION STANDARDS

(Shafting, Keys, Chain and Sprockets)

(a) These transmission equipment standards were prepared by the Special A.P.I. Committee on the Standardization of Rotary Drilling Equipment, and are recommended for equipment and machinery used for drilling and production purposes in the oil industry.

(b) The standards on shafting and square, flat and taper keys contained in these specifications were selected from the tentative American Standards on Shafting and Keys, Nos. B-17-a, B-17-b, B-17-e and B-17-d, established by the American Engineering Standards Committee and published by the American Society of Mechanical Engineers.

(c) The sprocket tooth form specified is the result of research work by C. R. Weiss, chairman of the sub-committee on chain.

(d) The standards on chain were selected from sizes now in general use.

(e) Manufacturers are urged, in designing new equipment or redesigning present equipment requiring shafting and keys, to select sizes from these specifications. Where sprockets are used, it is recommended that they use the form of tooth prescribed herein for use with A. P.I. Standard chain.

Recommendations on Usage

(f) When selections are made from Tables 1, 2 and 3, it is recommended that the key be maintained as standard within the tolerance specified. The depth of keyway in the shaft or mating member can be made to suit the conditions and material under consideration—by this method the key becomes interchangeable.

(g) While it is urged, for the sake of uniformity in shafts and keyways, that manufacturers be governed by these specifications, no authority can be granted to use the A.P.I. monogram on such shafts or keys except on those specific items for which definite specifications may be issued, such as rig irons and rotary line shafts. Manufacturers are authorized, however, to refer to these specifications in their printed matter, advertising, etc., where these standards are used.

SECTION 1

Material Covered

1. These specifications apply to the following material: shafting and keys, chains, sprocket-tooth form.

1-b The standards contained and illustrated herein are dimensional only, and apply to new equipment. These specifications do not include either chemical or physical properties of material, except as to finish.

SECTION 2

Workmanship and Finish

2-a. All machined or mating surfaces shall be finished in a good and workmanlike manner and shall be free from burrs, rough edges, etc.

2-b All castings shall be of good quality, free from blow holes, rough edges chipped or ground off, and shall be thoroughly cleaned.

SECTION 3

Marking

3-a. Chain manufactured in accordance with these standards may be stamped or marked with the official A.P.I. monogram, as stipulated in these specifications. This authorization will be granted in accordance with the conditions in the appendix.

3-b Permission to use the A.P.I. monogram can be granted only on chain. The standards on other material contained herein are for general application and use, but authority can not be granted to use the monogram thereon, in as much as such material, when used, becomes parts of other equipment.

3-c All material manufactured in accordance with these specifications shall be marked or stamped with the manufacturers name or other identifying mark.

3d Where the A.P.I. monogram is specified on mill roll or forged material it shall be applied with a steel stencil, size of monogram to be ½-inch high, as follows:

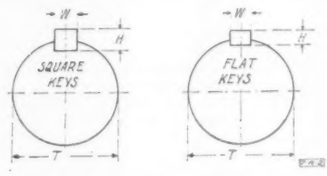
SECTION 4

Shafting and Keys

4-a Shafting and keys selected from Tables 1, 2 and 3 shall be standard.

4-b In order to reduce the number of sizes of shafting, the following range of sizes were adopted:

One-half inch to four inches diameter (inclusive) in variations of one-eighth



Figur · 1—Shafting and plain keys.

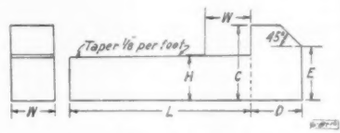


Figure 2—Gib head taper keys.

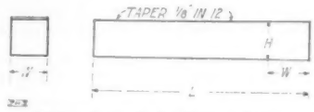


Figure 3—Plain head taper keys.

TABLE 1
A.P.I. STANDARD SHAFTING, SQUARE AND FLAT KEYS, AND KEY TOLERANCES
See Figure 1. All dimensions in inches at 68 degrees

Shaft Diameter (Nominal) "T"	Square Stock Keys Width "W"	Square Stock Keys Height "H"	Flat Stock Keys Width "W"	Flat Stock Keys Height "H"	Tolerances on stock keys * minus
½	⅛	⅛	⅛	3/32	0.0020
⅝, ¾, ⅞	3/16	3/16	3/16	⅛	.0020
1, 1⅛, 1¼	¼	¼	¼	3/16	.0020
1⅜, 1½, 1⅝, 1¾	⅜	⅜	⅜	¼	.0020
1⅞, 2, 2⅛, 2¼	½	½	½	⅜	.0025
2⅜, 2½, 2⅝, 2¾	⅝	⅝	⅝	7/16	.0025
2⅞, 3, 3⅛, 3¼	⅝	⅝	⅝	½	.0025
3⅜, 3½, 3⅝, 3¾	⅞	⅞	⅞	⅝	.0030
3⅞, 4, 4¼, 4½	1	1	1	¾	.0030
4¾, 5, 5¼, 5½	1¼	1¼	1¼	⅞	.0030
5¾, 6	1½	1½	1½	1	.0030

Shafting: The shafting diameters contained in Table 1 are standard. No tolerances are specified, due to different methods used by various manufacturers in manufacturing shafting, i. e.: machine turned or ground from hot finished and cold finished. When specified items requiring the use of shafting are standardized, the tolerances on the shafting must be specified to insure interchangeability.

*Keys: These tolerances are negative and represent the maximum allowable variation below the exact decimal size. For instance, the standard stock square key for a 2-inch shaft has a maximum size of 0.500 by 0.500 inches and a minimum size of 0.4975 by 0.4975 inches. It is understood that these keys are to be cut from cold finished stock and are to be used without further machining.

TABLE 3
A.P.I. STANDARD PLAIN HEAD TAPER KEYS
See Figure 3. All dimensions in inches at 68 degrees Fahrenheit

Shaft Diameter (Nominal) "T"	Square Type Maximum Width—"W"	Square Type Minimum Ht. Large End "H"*	Flat Type Maximum Width—"W"	Flat Type Minimum Ht. Large End "H"*	Tolerances Width Minus	Tolerances Height Plus
½	⅛	⅛	⅛	3/32	.0020	.0020
⅝, ¾, ⅞	3/16	3/16	3/16	⅛	.0020	.0020
1, 1⅛, 1¼	¼	¼	¼	3/16	.0020	.0020
1⅜, 1½, 1⅝, 1¾	⅜	⅜	⅜	¼	.0020	.0020
2, 2⅛, 2¼	½	½	½	⅜	.0025	.0025
2⅜, 2½, 2⅝, 2¾	⅝	⅝	⅝	7/16	.0025	.0025
2⅞, 3, 3⅛, 3¼	⅝	⅝	⅝	½	.0025	.0025
3⅜, 3½, 3⅝, 3¾	⅞	⅞	⅞	⅝	.0030	.0030
3⅞, 4, 4¼, 4½	1	1	1	¾	.0030	.0030
4¾, 5, 5¼, 5½	1¼	1¼	1¼	⅞	.0030	.0030
5¾, 6	1½	1½	1½	1	.0030	.0030

Note: *The height "H" of the key is measured at the distance "W" from the large end. The minimum stock length of keys is equal to 4 times the key width, and the maximum stock length of keys is equal to 16 times the key width. The increments of increase in length are equal to two times the width.

TABLE 2
A.P.I. STANDARD GIB HEAD TAPER KEYS
See Figure 2. All Dimensions in inches at 68 degrees Fahrenheit.

Shaft Diameter (Nominal) "T"	Square Type ** Key Maximum Width "W"	Square Type ** Key Minimum Height Large End "H"*	Square Type ** Gib Head Height "C"	Square Type ** Gib Head Length "D"	Square Type ** Gib Head Height Edge of Chamfer "E"	Flat Type ** Key Maximum Width "W"	Flat Type ** Key Minimum Height Large End "H"*	Flat Type ** Gib Head Height "C"	Flat Type ** Gib Head Length "D"	Flat Type ** Gib Head Height Edge of Chamfer "E"	Tolerance on Keys Width Minus	Tolerance on Keys Height Plus
½	⅛	⅛	¼	7/32	5/32	⅛	3/32	3/16	⅛	⅛	.0020	.0020
⅝, ¾, ⅞	3/16	3/16	5/16	9/32	7/32	3/16	⅛	¼	3/16	5/32	.0020	.0020
1, 1⅛, 1¼	¼	⅛	15/32	11/32	11/32	¼	3/16	5/16	¼	3/16	.0020	.0020
1⅜, 1½, 1⅝, 1¾	⅜	⅜	11/16	15/32	15/32	⅜	¼	15/32	⅜	5/16	.0020	.0020
1⅞, 2, 2⅛, 2¼	½	½	⅞	19/32	⅝	½	⅜	⅝	½	7/16	.0025	.0025
2⅜, 2½, 2⅝, 2¾	⅝	⅝	1 1/16	23/32	¾	⅝	7/16	¾	⅝	½	.0025	.0025
2⅞, 3, 3⅛, 3¼	⅝	⅝	1¼	⅞	⅞	⅝	½	⅞	⅝	⅝	.0025	.0025
3⅜, 3½, 3⅝, 3¾	⅞	⅞	1½	1	1	⅞	⅝	1 1/16	⅞	¾	.0030	.0030
3⅞, 4, 4¼, 4½	1	1	1⅝	1 3/16	1 3/16	1	¾	1¼	1	13/16	.0030	.0030
4¾, 5, 5¼, 5½	1¼	1¼	2	1 7/16	1 7/16	1¼	⅞	1½	1¼	1	.0030	.0030
5¾, 6	1½	1½	2½	1⅝	1⅝	1½	1	1⅝	1½	1⅛	.0030	.0030

Note: *The height "H" of the key is measured at the distance "W" from the large end.
**The minimum stock length of keys is equal to four times the key width, and the maximum stock length of keys is equal to 16 times the key width. The increments of increase in length are equal totwo times the width.

MORE SUCKER ROD SERVICE PER DOLLAR INVESTED!
Axelson Machine Company
P. O. Box 337, Los Angeles
Tulsa, St. Louis, New York City
Mid-Continent Distributors
Frick-Reid Supply Co.
Eastern Distributors
Frick & Lindsay Co.
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY
NO RADICAL CHANGES
100% AXELSON VANISHING THREAD
CONSTANTLY IMPROVED!
AXELSON SUCKER RODS

inch; this eliminates the one-sixteenth-inch sizes.

Four and one-fourth inches to six inches diameter (inclusive) in variations of one-fourth inch; this eliminates the one-sixteenth-inch and one-eighth-inch sizes.

Over 6 inches diameter, in variations of one-half inch; this eliminates the one-sixteenth-inch, one-eighth-inch and one-fourth-inch sizes.

SECTION 5
Chain

5-a. Pitch is a chordal dimension and is equal to the distance between the centers of two consecutive chain joints.

5-b. A.P.I. standard chain shall be designated as Nos. 3, 3½ and 4, with the corresponding dimensions shown in Figure 4, and Table 4.

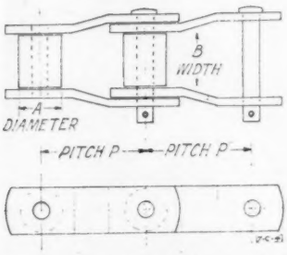


Figure 4—A.P.I. standard chain pitch and roller dimensions.

TABLE 4

ROLLER DIMENSIONS FOR A.P.I. STANDARD CHAIN

See Figure 4
All Dimensions in Inches

A.P.I. Chain No.	Old Numbers	Pitch "P"	Roller Diameter "A"	Roller Width "B"
3	1030 SS-40	3.075	1¼	1 7/16
3½	1135 1240	3.500	1⅝	1 7/16
4	SS-124	4.063	1¾	1⅞

5-c. New A.P.I. standard chain shall have a permissible plus tolerance of .008 inch per pitch. Standard stock and shipping lengths shall be 10 feet. Chain lengths shall have the tolerances shown in Figure 5 and Table 5. The tolerances shown in Table 5 are based on the total number of lengths or pitches required to make up a length of chain approximately 10 feet long. The lengths of chain shall be measured when the chain is new, under a fixed measuring load of 50 pounds.

Figure 5—A.P.I. standard chain length tolerances.

TABLE 5

STOCK CHAIN LENGTHS AND TOLERANCES for A.P.I. STANDARD CHAIN

See Figure 5
All dimensions in Inches

A.P.I Chain No.	Pitch "P"	No. of Links in10-Foot Lengths	Length of Chain Minimum "E"	Maximum "D"
3	3.075	39	119.925	120.237
3½	3.500	34	119.000	119.272
4	4.063	29	117.827	118.059

SECTION 6
Sprocket Tooth Form

6-a. For the purpose of this specification the tooth profile is defined as that section shown on a plane normal to the sprocket axis. See Figure 7.

6-b. The tooth profile is divided into five elements or sections, symmetrical about a diametral center-line through the center of the tooth crest, which sections are described in detail hereinafter. These sections are as follows:

(a) Tooth gap bottom (circular)
(b) Lower flank (circular)
(c) Flat face (straight)
(d) Upper flank (circular)
(e) Crest (circular on cast teeth)

6-c. The tooth outline is defined as that section shown on the plane of the sprocket bore axis, and on a diametral center line through the center of the tooth crest. See Figure 6.

6-d. The width "K" of the tooth at the base ("outline" section) shall be determined from the relationship to roller width shown by the following formula:

$K = (0.924)\ (B)$

Where

K = Width of tooth base, inches
B = Width of roller, inches

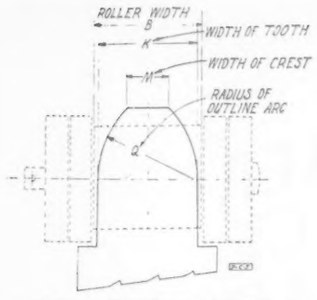


Figure 6—Sprocket tooth outline.

6-e. The width "M" of the tooth crest ("outline" section) shall be determined from the relationship between chain pitch and base width as shown by the following formula:

$M = K - (P/4)$

where

M = Width of tooth crest, inches
K = Width of tooth base, inches
P = Pitch, inches

6-f. The radius "Q" of the tooth outline arc shall be determined from the relationship to the pitch shown by the following formula:

$Q = (4/P)\ [(P/8)^2 + (0.3P)^2]$

whence

$Q = P/16 + (0.36)\ (P)$

Where

Q = Radius of tooth outline arc, inches
P = Pitch, inches

S. F. PATRICK
Rotary Drilling Equipment.

Pitch Diameter
See Figure 7

7-a. Pitch diameter "D" is the diameter of that circle which intersects the centers of the chain joints.

Note: More accurately, pitch diameter is the diameter of that circle on which the "working centers" are laid out. (q. v. hereinafter.)

7-b. Pitch chord "P" is the distance between consecutive chain joints as laid out on the pitch circle. See Figure 7: chord (R-R').

7-c. The pitch diameter of A.P.I. standard sprockets shall be determined by the relationship between the pitch and the number of teeth as shown by the following formula:

$D = (P)\ (\text{cosec } 180/N)$

Where

D = pitch, diameter, inches
P = pitch, inches
N = number of teeth in sprocket
cosec = natural cosecant

Note: Table 7 has been prepared as an aid in calculating pitch diameters. This table gives the natural cosecant of the angle 180/N, for numbers of teeth from 6 to 50 inclusive. For derivation of the formula see A.P.I. Bul. 51, Vol. 6.

Root Diameter
See Figure 7

8-a. Root diameter "C" is the diameter of that circle which lies tangent to the bottoms of the tooth gaps.

8-b. The root diameter of A.P.I. standard sprockets shall be determined from the relationship between pitch diameter and roller diameter shown by the following formula:

$C = D - [(1.005)\ (A) + 0.003]$

Where

C = Root diameter, inches
D = Pitch diameter, inches
A = Roller diameter, inches

Pitch Line Clearance
See Figure 7

9-a. Pitch line clearance "L" is that distance, measured as a chord on the pitch circle, by which the tooth thickness is diminished in order to obtain clearance between (a) the near (contiguous) sides of two consecutive rollers, and (b) the flanks of the intervening tooth.

L. J. BLACK
Rotary Drilling Equipment.

9-b. The pitch line clearance of A.P.I. standard cut sprockets shall be zero.

9-c. The pitch line clearance of A.P.I. standard cast sprockets shall be 3% (three per cent) of the chain pitch "P" for sprockets having 14 (fourteen) teeth or less; shall be 4% (four per cent) of the chain pitch for sprockets having 15 to 24 (fifteen to twenty-four) teeth, and shall be 5 per cent of the chain pitch for sprockets having 25 (twenty-five) teeth or more.

9-d. Table 8 gives the values of the pitch line clearance "L" for the three sizes of A.P.I. standard chains.

Tooth Gap Bottom and Lower Flank
See Figure 7

10-a. The lower flanks of teeth for A.P.I. standard sprockets shall be formed in circular arcs with center and radius as specified hereinafter.

10-b. Pitch chords laid out on the pitch circle establish the "working center" (R or R') for a given lower tooth flank (U-V). The pitch line clearance "L", measured as a chord on the pitch circle from the above working center (R), establishes the second "working center" (S), or that center defining the adjacent lower flank of the next tooth.

Note: In cut gears, the "pitch line clearance" is zero, therefore in cut gears the two "working centers" are identical.

10-c. The arc (U-V) forming the lower flank of the tooth is centered on the "working centers" defined above, and has a radius "E" determined from the relationship to the roller diameter shown by the following formula:

$E = [(1.005)\ (A) + 0.003]/2$

Where

E = Radius of lower tooth flank, inches
A = Diameter of roller, inches

Note: Obviously the arc of the adjacent lower flank of the next tooth has the same radius, with center as defined in paragraph 10-b.

10-d. In cut sprockets, for which this specification provides zero pitch line clearance, the same center is used for determining the adjacent lower flanks of any two consecutive teeth. Therefore it follows naturally that the bottom of the tooth gap (U-U') (in cut sprockets) is a circular arc, having the same radius and center as the adjacent lower flanks of any two consecutive teeth. In cast sprockets, for which this specification provides a definite pitch line clearance, the root circle becomes the bottom of the tooth gap, between its intersections ("points of tangency") with the lower flank arcs determined as per paragraphs 10-b and 10-c above.

Pressure Angle
See Figure 7

11-a. The pressure angle, is the angle included between the line of the pull in the chain and the line of the pressure of the chain joint normal to the tooth flank. Practically the line of pull in the chain may be considered as coincident with the pitch chord, but for lay-out purposes the line of pull in the chain is defined as coincident with that chord (S-R') joining the lower flank "working centers" of a given tooth. (See note to paragraph 11-d.)

11-b. The pressure angles for sprockets having from 6 to 11 (six to eleven) teeth, inclusive, shall be as follows:

No. of teeth	Angle, degrees
6	10
7	10
8	10
9	10
10	12
11	13.7

11-c. Pressure angles for sprockets having 12 (twelve) or more teeth shall be determined from the relationship between the tooth gap angle and the number of teeth in the sprocket as shown by the following formula:

$F = (90 - 180/N) - 60$

Whence

$F = 30 - 180/N$

Where

F = pressure angle, degrees
N = Number of teeth in sprocket

J. C. McCUE
Rotary Drilling Equipment.

11-d. The tooth gap angle is the included angle between adjacent flat faces of two consecutive teeth. The value of the tooth gap angle is specified as 60 degrees for all A.P.I. standard sprockets, both cut and cast.

Note: Since the forces described in paragraph 11-a as (a) the chain pull and (b) the reaction between tooth flank and roller, are co-planar and concurrent, they necessarily intersect at the roller axis, or, for design purposes, at the "working center" of the lower flank in question. Therefore, the pressure angle "F" has its apex at this working center (say R'); its upper leg is the pitch chord (or the chord R'-S for cast sprockets), and its value, obtained from this specification, determines the position of the lower leg (R'-V).

Compensating Flank, or Flat Face
See Figure 7

12-a. A.P.I. standard sprockets shall have a tooth profile in which is embodied a compensating flank or flat face, "H".

12-b. The compensating flank or flat

(Continued on Page 237)

A.P.I. SPECIFICATIONS FOR OIL FIELD BELTING

(Continued from Page 144)

in order to obtain the ultimate tensile strength which shall be:

Not less than 600 pounds per inch of width for single belts.

Not less than 1,100 pounds per inch of width for double belts.

Fatigue Test

B-8. This test will be described at some future date.

Cracking Test

B-9. A sample strip of belting, when bent 180 degrees around a 1-inch circular

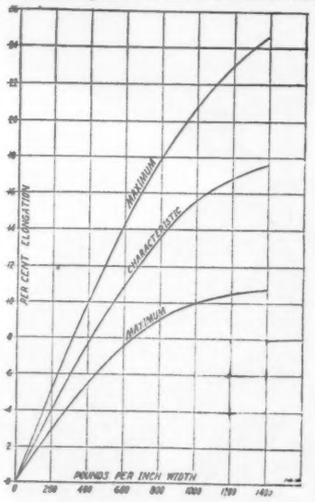


Figure 2.
A.P.I. initial elongation curve for leather belting. See Figure 1 for diagram of sample specimen.

mandrel, grain side out, shall not show any visible cracks.

Piping Test

B-10. A sample strip of belting, when bent 180 degrees around a 3-inch mandrel with grain surface inside, shall not show signs of coarse wrinkling or piping on the grain surface.

B-11. The width of the belt shall conform to that specified within the following tolerances:

Width up to 8 inches, inclusive, one-sixteenth-inch, plus or minus.

All widths over 8 inches, one-eighth-inch, plus or minus.

B-11-b. The thickness of the belt shall not vary more than one-sixteenth-inch from the thinnest to the thickest portion of the belt.

B-12. Belting shall bear the name of the manufacturer and the trade name of the belt. Workmanship shall be in accordance with best manufacturing practices and belt shall give good service under normal working conditions, and temperatures 10 degrees above or below the maximum or minimum working temperatures, respectively.

Note: The working temperatures referred to in Paragraph B-12 are the minimum and maximum atmospheric temperatures that obtain in the various districts where the belts are used.

B-13-a. The purchaser may make the tests governing the acceptance or rejection of the belting in his own laboratory or elsewhere, within six months after receipt of goods by consumer.

B-13-b. Samples of rejected belting shall be preserved for 30 days from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

B-13-c. Any length of belting which fails to meet the requirements of these specifications may be rejected.

SECTION C

A.P.I. Final Specifications for Impregnated Stitched Cotton Fabric Belting.

(Other than stitched rubber and balata belting)

C-1. Belting of this class shall consist of plies of uniformly woven duck, suitably stitched together with lock stitching. The stitches shall be interlocked midway between the surfaces of the belting.

C-2. The finished belts shall be impregnated with a special compound which will lubricate the internal fibers of the belt, will not be affected by extremes of temperature and will not bleed, oxidize deteriorate or harden by continued exposure to the atmosphere.

Physical Tests

C-3. Tests shall be made in an atmospheric temperature of from 70 to 85 degrees Fahrenheit. The samples shall be kept in a temperature between these limits at least four hours previous to the time of the tests, relative degree of humidity 65 per cent.

Sampling

C-4. Samples the full width and thickness of the belt shall be taken of each lot of belting.

Initial Elongation Test

C-5-a. Test specimen 20 inches in length shall have transverse reference lines marked upon it 8 inches apart and at equal distance from the ends, as shown in Figure 1.

C-5-b. Specimen shall be tested in an approved type of vertical testing machine. The rate of the separation of the jaws shall be between one-half inch and 1 inch per minute. The test machine shall be equipped with wedge-shaped jaws. The base of the jaw shall be at right angles with the longitudinal center of the belt; all surfaces shall be true; the back and edge surfaces shall be properly cleaned and well lubricated; the base surfaces of the two edges of each set of jaws shall be in the same horizontal plane.

C-5-c. The elongation shall be taken at the pounds tension shown in Table 2 by means of a divider and the measurement made on a true scale to be within the limits shown in Table 2.

TABLE 2
Initial Elongation Impregnated Stitched Cotton Fabric Belting

Pounds Tension per inch per ply	Per Cent Elongation Maximum	Minimum
50	4.7	3.0
100	8.1	6.0
150	10.8	8.8
200	13.0	11.0
250	14.6	12.6

C-5-d. The trend of the initial elongation curve shall be uniform and shall conform to the graph, Figure 3.

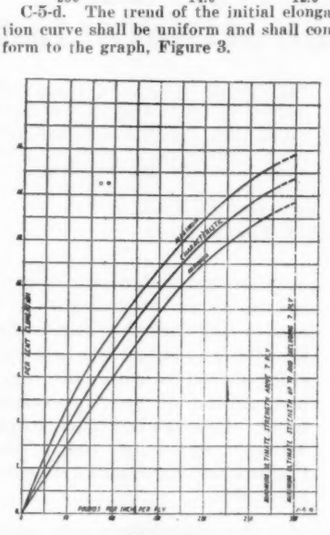


Figure 3.
A.P.I. initial elongation curve for impregnated stitched fabric belting. See Figure 1 for diagram of sample specimen.

Ultimate Strength Test

C-6. The elongation test described above shall continue to the breaking point in order to obtain the ultimate tensile strength which shall not be less than:

300 pounds per inch per ply up to and including 7 ply; and

275 pounds per inch per ply above 7 ply.

Fatigue Test

C-7. This test will be described at some future time.

C-8. The width of belting shall conform to that specified within the following tolerances:

Width up to 12 inches, inclusive, three-sixteenths-inch, plus or minus.

Over 12 inches to 24 inches, inclusive, one-quarter inch, plus or minus.

C-9-a. Workmanship shall be in accordance with best manufacturing practices and belt shall give good service under normal working conditions and temperature 10 degrees above or below maximum or minimum working temperatures, respectively.

Note: The working temperatures referred to in Paragraph C-9-a are the minimum and maximum atmospheric temperatures that obtain in the various districts where belts are used.

C-9-b. Belting shall bear the name of the manufacturer and the trade name of the belt.

C-10-a. The purchaser may make the tests governing the acceptance or rejection of the belting in his own laboratory, or elsewhere, within six months after receipt of the goods by the consumer.

C-10-b. Samples of rejected belting shall be preserved for 30 days from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

C-10-c. Any length of belting which fails to meet the requirements of these specifications may be rejected.

SECTION D

A.P.I. Tentative Specifications for Solid Woven Hair Belting

D-1-a. Hair belts shall be made in three principal thicknesses, designated as single, double and triple, with tolerance of one-thirty-second inch, plus or minus.

D-1-b. Single belts shall have a nominal thickness of one-quarter inch.

D-1-c. Double belts shall have a nominal thickness of five-sixteenths of an inch.

D-1-d. Triple belts shall have a nominal thickness of three-eighths of an inch.

D-2. Belts of uniformly greater thickness than three-eighths of an inch shall be named and stamped as special belts.

D-3. The belting shall be evenly and firmly woven and as free from such defects as foreign matter, knots, lumps and irregularities of twist as is consistent with the best manufacturing practice.

D-4. The finished belts shall be impregnated with a special compound which will lubricate the internal fibers of the belt, will not be affected by extremes of temperature and will not bleed, oxidize, deteriorate or harden by continued exposure to the atmosphere.

Physical Tests

D-5. Tests shall be made in an atmospheric temperature of from 70 to 85 degrees Fahrenheit. The samples shall be kept at a temperature between these limits at least four hours previous to the time of the tests, relative degree of humidity 65 per cent.

Sampling

D-6. Samples the full width and thickness of the belt shall be taken of each lot of belting.

Initial Elongation Test

D-7-a. Test specimen 20 inches in length shall have transverse reference lines marked upon it 8 inches apart and at equal distance from ends, as shown in Figure 1.

D-7-b. Specimen shall be tested in an approved type of vertical tension testing machine. The rate of the separation of the jaws shall be between one-half inch and 1 inch per minute. The test machine shall be equipped with wedge-shaped jaws. The base of the jaws shall be at right angles with the longitudinal center of the belt; all surfaces shall be true; the back and edge surfaces shall be properly cleaned and well lubricated; the base surfaces of the two edges of each set of jaws shall be in the same horizontal plane.

D-7-c. The elongation shall be taken at the pounds tension shown in Table 3 by means of a divider and the measurement made on a true scale with inches graduated in tenths, the per cent of elongation to be made within the limits shown in Table 3.

TABLE 3
Initial Elongation Solid Woven Hair Belting

Pounds Tension per inch of width	Per Cent Elongation Maximum	Minimum
400	7.5	5.5
800	13.0	11.0
1,200	17.0	15.0
1,600	19.5	17.5

D-7-d. The trend of the initial elongation curve shall be uniform and conform to the graph, Figure 4.

Ultimate Strength Test

D-8. The elongation test described above shall continue to the breaking point in order to obtain the ultimate tensile

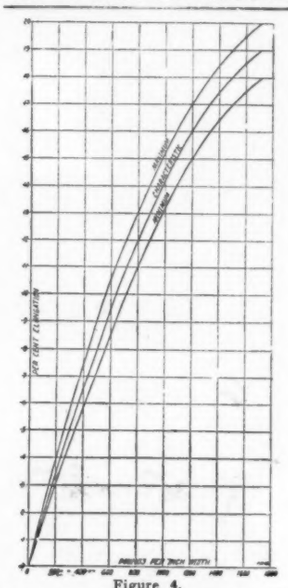


Figure 4.
A.P.I. initial elongation curve for solid woven hair belting. See Figure 1 for diagram of sample specimen.

strength which shall not be less than:

1,200 pounds per inch width for singles.
1,300 pounds per inch width for doubles.
1,400 pounds per inch width for triples.

Fatigue Tests

D-9. This test will be described at some future date.

D-10. The width of belting shall conform to that specified within the following tolerances:

Width up to 12 inches, inclusive, three-sixteenths-inch, plus or minus.

Over 12 inches to 24 inches, inclusive, one-quarter inch, plus or minus.

D-11. Belting shall bear the name of the manufacturer and trade name of the belt. Workmanship shall be in accordance with best manufacturing practices and belt shall give good service under normal working conditions, and temperatures 10 degrees above or below the maximum or minimum working temperatures, respectively.

Note: The working temperatures referred to in Paragraph D-11 are the minimum and maximum atmospheric temperatures that obtain in the various districts where the belts are used.

D-12-a. The purchaser may make the tests governing the acceptance or rejection of the belting in his own laboratory, or elsewhere, within six months after receipt of goods by consumer.

D-12-b. Samples of rejected belting shall be preserved for 30 days from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

D-12-c. Any length of belting which fails to meet the requirements of these specifications may be rejected.

SECTION E

A.P.I. Tentative Specifications for Solid Woven Cotton Belting

E-1-a. Belts shall be made in three principal thicknesses designated as single, double and triple, with tolerance of one-thirty-second-inch, plus or minus.

E-1-b. Single belts shall have a nominal thickness of one-quarter inch.

E-1-c. Double belts shall have a nominal thickness of five-sixteenths of an inch.

E-1-d. Triple belts shall have a nominal thickness of three-eighths of an inch.

E-2. Belts of uniformly greater thickness than three-eighths of an inch shall be named and stamped as special belts.

E-3. The belting shall be evenly and firmly woven and as free from such defects as foreign matter, knots, lumps and irregularities of twist as consistent with the best manufacturing practice.

E-4. The finished belts shall be impregnated with a special compound which will lubricate the internal fibers of the belt, will not be affected by extremes of

maximum

Cost of Transportation Is the Determining Factor in the Keen Competition of the Oil Industry Today

["Efficiency in refining has become so general that competition has to look elsewhere for advantage."

"With competition so keen and operating costs so equalized * * * transportation charges are about the only advantage in marketing."

"More and more is it being found that the determining factor is cost of transportation."

"Wherever possible the refining industry is turning to cheaper means of transportation as tipping the balance in present day marketing competition."]

(Excerpts from an editorial in The Oil and Gas Journal of August 28th)

IN turning to cheaper means of transportation the oil industry is turning to trailer transport as offering the most economical transportation link between refinery and consumption; between wharf and consumption or between bulk depot and consumption.

Trailer transport was made practical through the development, by Columbian engineers, of integral tank design and construction wherein the tank, its mounting and its discharge lines are welded into an integral, monometallic unit.

Now, in trailer tank construction the frame of the trailer is built as an integral part of the tank. Fifth-wheel and rear springs are shackled to the sub-structure of the tank. Deadload is cut to the minimum. The belly of the tank rides almost as low as the rear axle of the truck-tractor—low center of gravity—safety. Compact—less investment. Enables the truck to pull twice what it will carry—lower operating cost. The industry is turning to Columbian Frameless Trailer Transport for these advantages.

5500 GALLONS PER TRIP

deliveries

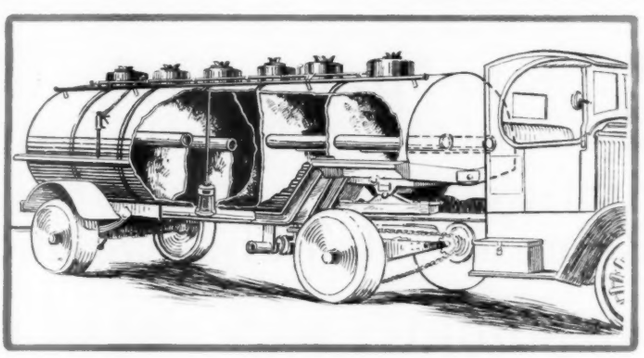
Frameless Trailer Transport Cuts Transportation Cost!

Less Investment—Less Operating Cost Per Gallon

COLUMBIAN truck tank design is founded upon partition mounting, *i. e.* the extending of the heads and partitions to form the sub-structure. It eliminates cross cradles and sills.

Like most pioneering steps this was considered revolutionary.

When Columbian engineers banished pipe line troubles forever by welding all lines integral with the sub-structure the idea was welcomed but the accomplishment was doubted.



But, they dared to introduce a score of other truck tank improvements none of which, however, were subjected to such vicious flank attacks as were directed against the 3-point support, a feature which frees the tank of twisting strains.

One after another the doubting Thomases have been converted by the unapproached, history making performance of the Columbia Truck Tank, the design and construction of which welds the tank, its sub-structure, its pipe lines and its bucket box into an integral, monometallic unit.

Today the Columbian Truck Tank occupies an enviable position, the pinnacle of popularity won in the face of skepticism—gained through sheer performance.

Today Frameless Trailer Transport, to which the oil industry is turning, would not be practical had not Columbian pioneering preceded.

What other construction can lower the belly of the tank to the level of the rear axle? Without this, trailer transport is not safe.

What other construction can incorporate the frame of the trailer chassis as an integral part of the tank?

What other construction permits shackling rear springs and fifthwheel to the sub-structure of the tank itself?

It is such engineering strides as these that keep the dead-load down to a minimum—lower the investment—cut the per gallon operating cost to give that much sought after advantage in present day marketing.

Columbian Trailer Transport enables your motive power to pull twice what it will carry. An installation by Columbian engineers will more than demonstrate the saving that the preceding statement suggests.

Get Acquainted With the Frameless Trailer Transport at Tulsa Exposition, Sept. 24-Oct. 1

COLUMBIAN STEEL TANK COMPANY

EST'D 1894

TANKS FOR THE WORLD

1405-1625 WEST 12TH STREET KANSAS CITY, MISSOURI

BAROID HAS MADE GOOD

TALK to Mr. Ben Taylor of the Peden Iron and Steel Company of Houston, Texas, or to Mr. Thos. E. Robinson of Tulsa, Oklahoma.

A few minutes with one of these gentlemen will save you money —and your oil well

National Pigments and Chemical Company

St. Louis, Mo.

temperature and will not bleed, oxidize, deteriorate or harden by continued exposure to the atmosphere.

Physical Tests

E-5. Tests shall be made in an atmospheric temperature of from 70 to 85 degrees Fahrenheit. The samples shall be kept at a temperature between these limits at least four hours previous to the time of tests, relative humidity 65 per cent.

Sampling

E-6. Samples the full width and thickness of the belt shall be taken from each lot of belting.

Initial Elongation Test

E-7-a. Test specimen 20 inches in length shall have transverse reference lines marked upon it 8 inches apart and at equal distance from the ends as shown in Figure 1.

E-7-b. Specimen shall be tested in an approved type of vertical tension testing machine. The rate of the separation of the jaws shall be between one-half inch and 1 inch per minute. The test machine shall be equipped with wedge-shaped jaws. The base of the jaws shall be at right angles with the longitudinal center of the belt; all surfaces shall be true; the back and edge surfaces shall be properly cleaned and well lubricated; the base surface of the two edges of each set of jaws shall be in the same horizontal plane.

E-7-c. The elongation shall be taken at the pounds tension shown in Table 4 by means of a divider and the measurement made on a true scale with inches graduated in tenths, the per cent of elongation to be within the limits shown in Table 4.

TABLE 4
Initial Elongation: Solid Woven Cotton Belting

Pounds Tension per inch of width	Per Cent Elongation Maximum	Minimum
400	8	6
800	11	9
1,200	13	11
1,600	15	13

E-7-d. The trend of the initial elongation curve shall be uniform and shall conform to the graph, Figure 5.

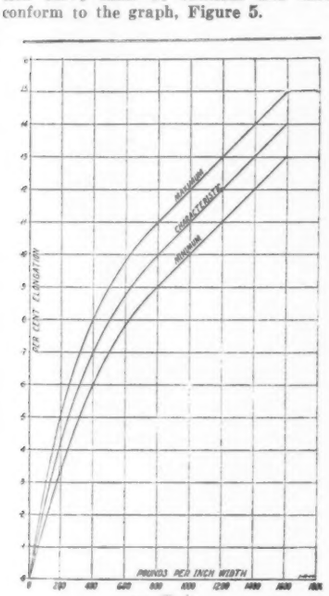


Figure 5.
A.P.I. initial elongation curve for solid woven cotton belting. See Figure 1 for diagram of sample specimen.

Ultimate Strength Test

E-8. The elongation test described above shall continue to the breaking point in order to obtain the ultimate tensile strength which shall not be less than:

1,200 pounds per inch width for singles.
2,000 pounds per inch width for doubles.
2,500 pounds per inch width for triples.

Fatigue Test

E-9. This test will be described at some future date.

E-10. The width of belting shall conform to that specified within the following tolerances:

Width up to 12 inches, inclusive, three-sixteenths-inch, plus or minus.

Over 12 to 24 inches, inclusive, one-quarter-inch, plus or minus.

E-11. Belting shall bear the name of the manufacturer and the trade name of the belt. Workmanship shall be in accordance with best manufacturing practices and belt shall give good service under normal working conditions, and temperatures 10 degrees above or below maximum or minimum working temperatures, respectively.

Note—The working temperatures referred to in Paragraph E-11 are the minimum and maximum atmospheric temperatures that obtain in the various districts where the belts are used.

F-12-a. The purchaser may make the tests governing the acceptance or rejection of the belting in his own laboratory, or elsewhere, within six months after receipt of goods by the consumer.

E-12-b. Samples of rejected belting shall be preserved for 30 days from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for rehearing within that time.

E-12-c. Any length of belting which fails to meet the requirements of these specifications may be rejected.

SECTION F

A.P.I. Final Specifications for Balata Belting

F-1. Balata belting shall consist of plies of uniformly woven duck, thoroughly impregnated with genuine balata gum solution and pressed together uniformly.

F-2. Belts 500 feet or less in length must be made without any transverse splices. Belts over 500 feet in length, transverse splices used, shall be diagonal and no such splices in adjacent plies shall be placed nearer than 15 feet to each other.

Physical Tests

F-3. Tests shall be made in an atmospheric temperature of from 70 to 85 degrees Fahrenheit. The samples shall be kept at a temperature between these limits at least four hours previous to the time of tests, relative humidity 65 per cent.

Sampling

F-4. Samples the full width and thickness of the belt shall be taken of each lot of belting.

Initial Elongation Test

F-5-a. Test specimen 20 inches in length shall have transverse reference lines marked upon it 8 inches apart and at equal distance from the ends, as shown in diagram. See Figure 1.

F-5-b. Specimen shall be tested in an approved type of vertical tension testing machine. The rate of the separation of the jaws shall be between one-half and 1 inch per minute. The test machine shall be equipped with wedge-shaped jaws. The base of the jaws shall be at right angles with the longitudal center of the belt; all surfaces shall be true; the back and edge surfaces shall be properly cleaned and well lubricated; the base surfaces of the two edges of each set of jaws shall be in the same horizontal plane.

F-5-c. The elongation shall be taken at the pounds tension shown in Table 5 by means of a divider and the measurement made on a true scale with inches graduated in tenths, the per cent of elongation to be within the limits shown in Table 5.

TABLE 5
Initial Elongation
BALATA BELTING

Lbs. Tension per inch per ply	Pct. of Elongation Max.	Min.
50	5.2	3.7
100	9.8	7.5
150	12.9	10.9
200	15.0	13.0
250	16.2	14.2
300	17.1	15.0

F-5-d. The trend of the initial elongation curve shall be uniform and shall conform to the graph, Figure 6.

F-6. The elongation test described above shall continue to the breaking point in order to obtain the ultimate tensile strength, which shall not be less than 350 pounds per inch per ply.

Friction Test

F-7. Friction specimens shall be taken longtudinally of the sample of belting and shall be tested to determine the adhesion between the plies. The adhesion between the plies shall be such that a weight of 16 to 18 pounds will not cause separation of plies at a rate greater than 1 inch per minute when separated at an angle of 180 degrees on a strip of belting 1 inch wide. The adhesion between

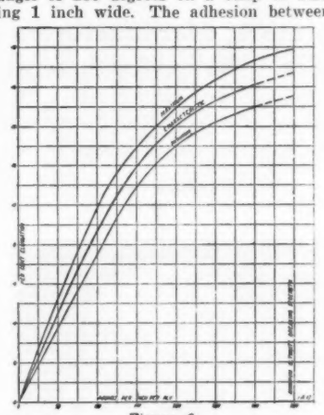


Figure 6.
A.P.I. initial elongation curve for Balata belting. See Figure 1 for diagram of sample specimen.

the plies shall be reasonably uniform and within the test limits throughout the thickness of the belt.

F-8. The width of belting shall conform to that specified within the following tolerances:

Width up to 12 inches, inclusive, three-sixteenths-inch, plus or minus.

Over 12 to 24 inches, inclusive, one-quarter-inch, plus or minus.

F-9. Belting shall bear the name of the manufacturer and the trade name of the belt. Workmanship shall be in accordance with best manufacturing practices, and belt shall give good service under normal conditions, and temperatures 10 degrees above or below maximum or minimum work temperatures, respectively.

Note—The working temperatures referred to in Paragraph F-9, are the minimum and maximum atmospheric temperatures that obtain in the various districts where the belts are used.

F-10-a. The purchaser may make the tests governing the acceptance or rejection of the belting in his own laboratory, or elsewhere, within six months after receipt of goods by the consumer.

F-10-b. Samples of rejected belting shall be preserved for 30 days from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

F-10-c. Any length of belting which fails to meet the requirements of these specifications may be rejected.

SECTION G

A.P.I. Final Specifications for Rubber Belting

G-1. Belting of this class shall consist of plies of uniformly woven duck, frictioned with a rubber compound and vulcanized together in a uniform manner.

G-2. Belts 540 feet or less in length must be made without any transverse splices. Belts over 540 feet in length, transverse splices used shall be diagonal and no such splices in adjacent plies shall be placed nearer than 15 feet to each other.

Physical Tests

G-3. Tests shall be made in an atmospheric temperature of from 70 to 85 degrees Fahrenheit. The samples shall be kept at a temperature between these limits at least four hours previous to the time of tests, relative humidity 65 per cent.

Sampling

G-4. Samples the full width and thickness of the belt shall be taken of each lot of belting.

Initial Elongation Test

G-5-a. Test specimen 20 inches in length shall have transverse reference lines marked upon it 8 inches apart and at equal distances from the ends, as shown in Figure 1.

G-5-b. Specimen shall be tested in an approved type of vertical tension testing machine. The rate of the separation of the jaws shall be between one-half inch and 1 inch per minute. The test machine shall be equipped with wedge-shaped jaws. The base of the jaws shall be at right angles with the longitudinal center of the belt; all surfaces shall be true; the back and edge surfaces shall be properly cleaned and well lubricated; the base surfaces of the two edges of each set of jaws shall be in the same horizontal plane.

G-5-c. The elongation shall be taken at the pounds tension shown in Table 6 by means of a divider and the measurement made on a true scale with inches graduated in tenths, the per cent of elongation to be within the limits shown in Table 6.

TABLE 6
Initial Elongation
Rubber Belting

Lbs. Tension per inch per ply	Pct. of Elongation Max.	Min.
50	4.5	2.6
100	8.2	5.0
150	10.8	7.3
200	13.0	9.0
250	14.6	.98
300	15.6	10.3

G-5-d. The trend of the initial elongation curve shall be uniform and shall conform to the graph, Figure 7.

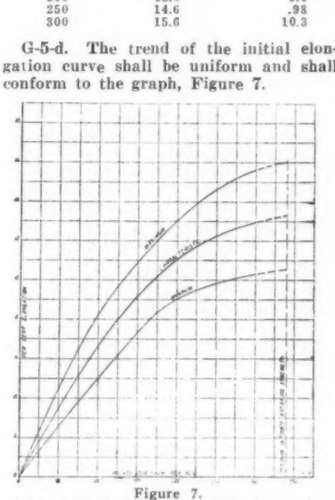


Figure 7.
A.P.I. initial elongation curve for rubber belting. See Figure 1 for diagram of sample specimen.

Ultimate Strength Test

G-6. The elongation test described above shall continue to the breaking point in order to obtain the ultimate tensile strength, which shall not be less than 340 pounds per inch per ply.

Fatigue Test

G-7. This test will be described at some future time.

Friction Test

G-8. Friction specimens shall be taken longitudinally of the sample of belting and shall be tested to determine the adhesion between the plies. The adhesion between the plies shall be such that a weight not less than 18 pounds will cause separation of plies at a rate not greater than 1 inch per minute when separated at an angle of 180 degrees on a strip of belting 1-inch wide. The adhesion between the plies shall be reasonably uniform throughout the thickness of the belt.

G-9. The width of belting shall conform to that specified within the following tolerances:

Width up to 12 inches, inclusive, three-sixteenth-inch, plus or minus.

Over 12 to 24 inches, inclusive, one-quarter-inch, plus or minus.

G-10. Belting shall bear the name of the manufacturer and the trade name of the belt. Workmanship shall be in accordance with best manufacturing practices, and belt shall give good service under normal working conditions and temperatures 10 degrees above or below maximum or minimum working temperatures, respectively.

Note—The working temperatures referred to in Paragraph G-10 are the minimum and maximum atmospheric temperatures that obtain in the various districts where the belts are used.

G-11-a. The purchaser may make the tests governing the acceptance or rejection of the belting in his own laboratory,

Continued on Page 302)

Standardization of Oil Field Boilers

Operators, Manufacturers and Sub-Committee of A. S. M. E. Conferred for Several Years in Working Out Details

By S. J. Dickey
National Chairman, Committee on Standardization of Oil Field Boilers

During the past several years six different subcommittees, composed of oil field operators in the respective oil production districts, acting in co-operation with a committee, composed of oil field boiler manufacturers, and a subcommittee conferring with the A. S. M. E. Boiler Code Committee, have been industriously engaged in working out the details of a standard boiler for oil field use.

Standard A. P. I. specifications have been adopted by the American Petroleum Institute as a result of this work and are available as a guide to purchasers of oil field boilers and to manufacturers in the building of boilers for this type of service. Some of the advantages to be secured by purchasing A. P. I. standard boilers are outlined below:

Boiler Rating

In the past there has been no uniformity in the designation of the horsepower of a boiler. For example, one manufacturer may have called a boiler having only 450 square feet of heating surface, a 50-horsepower boiler, while another manufacturer rated his boiler, which may have had 600 or more square feet of heating surface, also as a 50-horsepower boiler. These two boilers would have very different steaming capacities.

In order that a purchaser would be assured of getting the same size boiler when he ordered by nominal size from any one of the many manufacturers, the committee agreed to rate A. P. I. boilers on a uniform basis and have specified 10 square feet of heating surface as constituting one boiler horsepower. This, with other items taken care of in the standard specifications, assures the purchaser that all A. P. I. standard boilers of any given size would have approximately the same steaming capacity.

Construction

The committee studied very carefully

S. J. DICKEY

construction features of boilers best adapted to oil field use, from both a safe and economical performance standpoint, and have agreed that all boilers bearing the A. P. I. monogram must be built according to the A. S. M. E. Boiler Construction Code, which was formulated after a great many years of boiler experience and has proven satisfactory even under adverse conditions frequently existing in oil fields. A boiler built according to this code must be properly designed and constructed and built of materials made especially for boiler construction.

Boilers which have been built in accordance with the A. P. I. specifications and bear the A. P. I. stamp can be operated in any part of the country without changes in the boiler to meet local requirements for obtaining permits for installation and operation.

Any difficulties experienced by any district in securing of permits under local regulations for the installation and operation of an A. P. I. boiler should be brought to the attention of the local district chairman as noted in the preliminary sheet to the A. P. I. specifications.

Pipe Connections

A. P. I. boilers all have the same size pipe connections. This allows batteries of boilers of the same or different sizes to be piped up without odd or special size fittings. It also allows replacing of a small boiler with a larger one without materially changing the piping. It will be noted the pipe sizes are reduced to a minimum number, which is a distinct advantage in piping and in the carrying of stocks of pipe and fittings.

Minor Construction Details

The number, location and size of hand hole plates now being a standard allows the operator to easily clean the boiler, allowing complete interchangeability of hand hole plates, gaskets and crabs. Uniformity of stacks and bonnets assists in the erection of the boiler, allows interchangeability and the utilization to the best advantage of such items when salvaged.

The major items of standardization of this A. P. I. boiler are indicated graphically in the figure accompanying this article. The committee is still working on standardization of some other details which may be of further improvement and of value to the operator in the future. These additional items, however, will not in any way limit the usability or desirability of a present A. P. I. standard boiler.

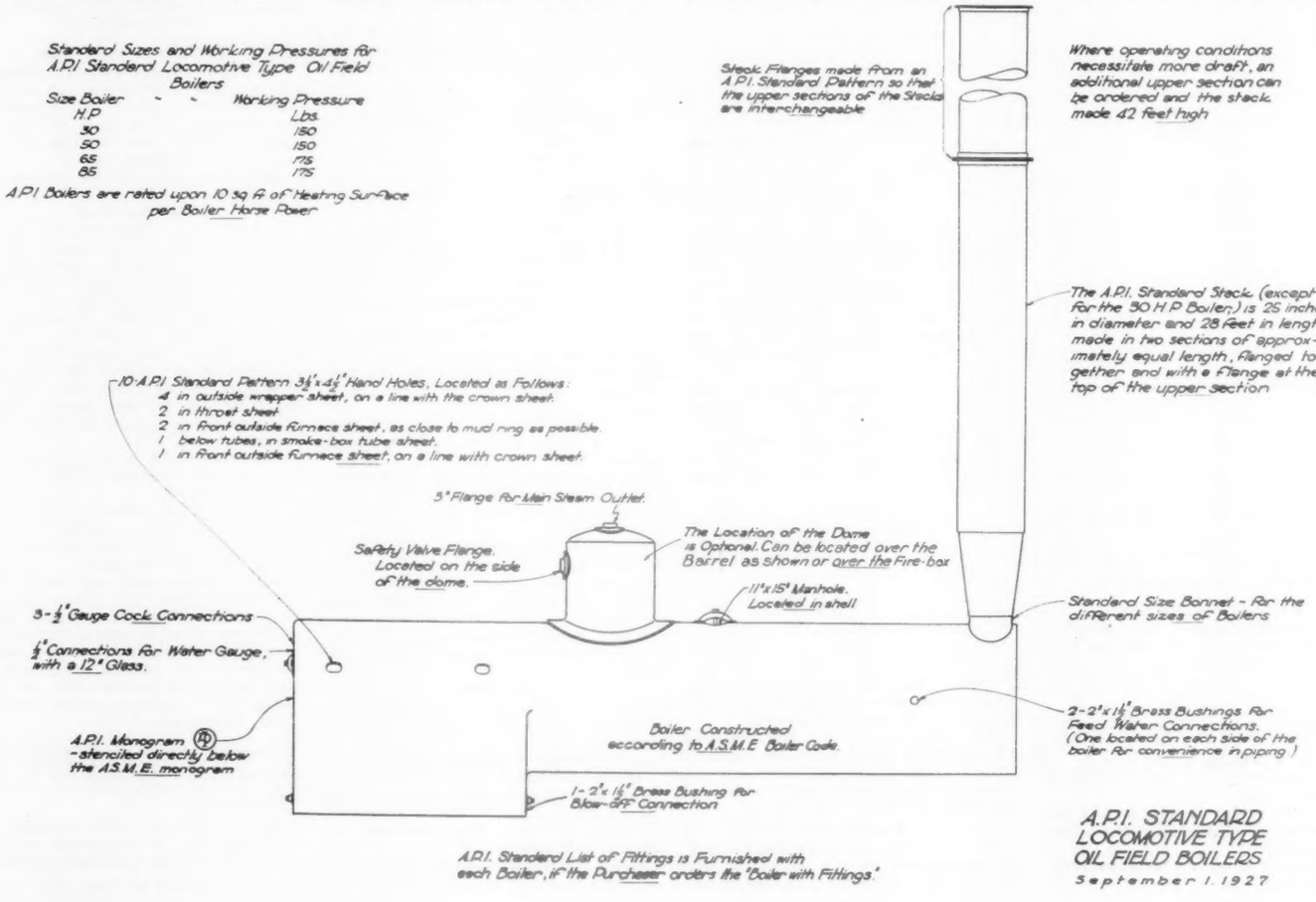
List of Fittings

In the past, in furnishing fittings with boilers each manufacturer and purchaser usually had varying ideas of the necessary size and kind of fittings. The committee, therefore, made a standard list of the number and sizes of fittings to be furnished with the boiler, when the purchaser desired fittings to be delivered with the boiler. In order to simplify this list of fittings and stocks, the standard size and number are the same for all A. P. I. size boilers with the exception that the 30-horsepower boiler only requires one safety valve.

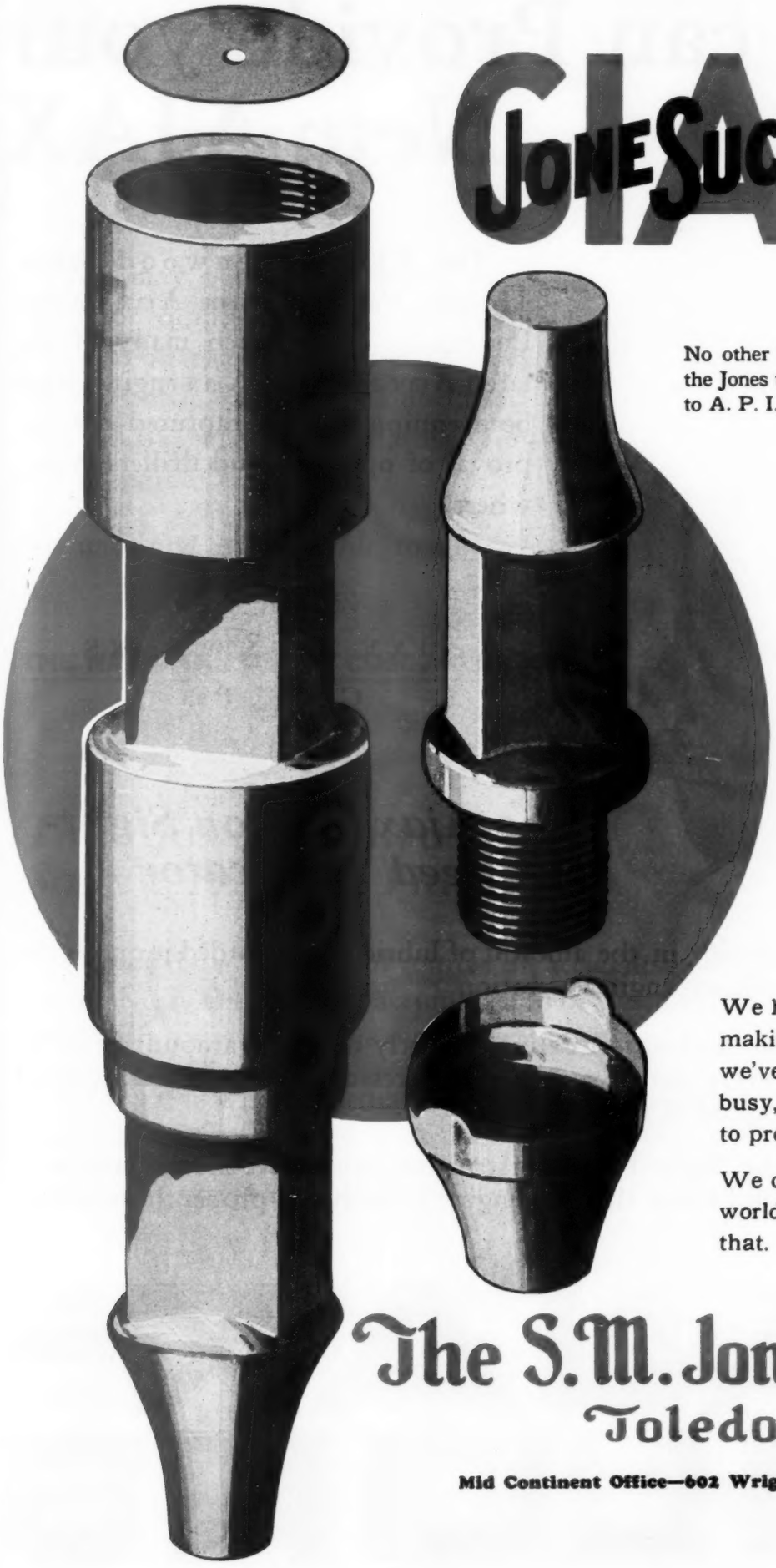
The specifications make the furnishing of fittings optional with the purchaser, so that the buyer can order an A. P. I. boiler with or without the standard list of fittings.

Future Committe Work

The work of the committee so far has been to specify a standard boiler, ironing out the major differences which were found to exist between the various boilers on the market. The committee has under consideration the further standardization


Standard Sizes and Working Pressures for A.P.I Standard Locomotive Type Oil Field Boilers
Size Boiler H.P. - Working Pressure Lbs.
30 150
50 150
65 175
85 175
A.P.I Boilers are rated upon 10 sq ft of Heating Surface per Boiler Horse Power
Stack Flanges made from an A.P.I. Standard Pattern so that the upper sections of the Stacks are interchangeable
Where operating conditions necessitate more draft, an additional upper section can be ordered and the stack made 42 feet high
The A.P.I. Standard Stack (except for the 30 H.P. Boiler,) is 25 inches in diameter and 28 feet in length, made in two sections of approximately equal length, flanged together and with a flange at the top of the upper section
10 A.P.I Standard Pattern 3½"x4½" Hand Holes, Located as Follows:
4 in outside wrapper sheet, on a line with the crown sheet.
2 in throat sheet.
2 in front outside furnace sheet, as close to mud ring as possible.
1 below tubes, in smoke-box tube sheet.
1 in front outside furnace sheet, on a line with crown sheet.
5" Flange For Main Steam Outlet.
Safety Valve Flange. Located on the side of the dome.
The Location of the Dome is Optional. Can be located over the Barrel as shown or over the Fire-box
11"x15" Manhole. Located in shell
Standard Size Bonnet - For the different sizes of Boilers
3-½" Gauge Cock Connections
½" Connections For Water Gauge, with a 12" Glass.
A.P.I. Monogram - stenciled directly below the A.S.M.E. monogram
2-2"x1½" Brass Bushings For Feed Water Connections. (One located on each side of the boiler for convenience in piping.)
Boiler Constructed according to A.S.M.E. Boiler Code.
1-2"x1½" Brass Bushing For Blow-Off Connection
A.P.I. Standard List of Fittings is Furnished with each Boiler, if the Purchaser orders the "Boiler with Fittings."
A.P.I. STANDARD LOCOMOTIVE TYPE OIL FIELD BOILERS
September 1, 1927

GIANT JONE SUCKER RODS



No other Rod has the milk bottle cap or the Jones thread protector. Threads made to A. P. I. Standards if desired.

No matter what thread is used it is only as good as the machine work.

We have to be extremely careful in making these Giant Rods, because we've got a mighty big plant to keep busy, and a mighty good reputation to protect—

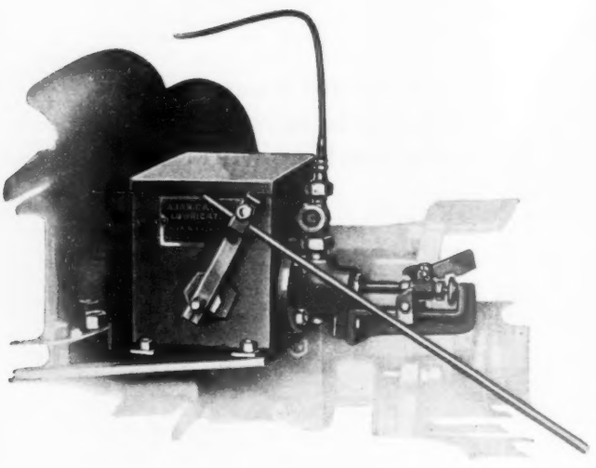
We claim these Giant Rods are the world's finest—and we mean just that.

The S. M. Jones Company
Toledo, Ohio.

Mid Continent Office—602 Wright Building, Tulsa, Oklahoma

Now you can Provide your *New* AJAX

The Ajax-Greenwood Safety Throttle Valve, and the Ajax-Carson Lubricator, with which many of the latest Ajax and Ideal-Ajax engines have been equipped, have captured the approval of operators and drillers everywhere.



Made by
AJAX IRON WORKS
Corry, Pa.

The Ajax-Carson Sight-Feed Lubricator

Absolute uniformity in the amount of lubrication afforded is one of the first essentials for efficient engine operation.

The Ajax-Carson Lubricator delivers exactly the right amount of oil to the steam line on every stroke, regardless of pressure, and regulates its speed of delivery by the speed of the engine.

Moreover, by the "Sight-Feed" construction you can *see* the oil on its way to the steam line, and *know* that the engine is receiving proper lubrication.

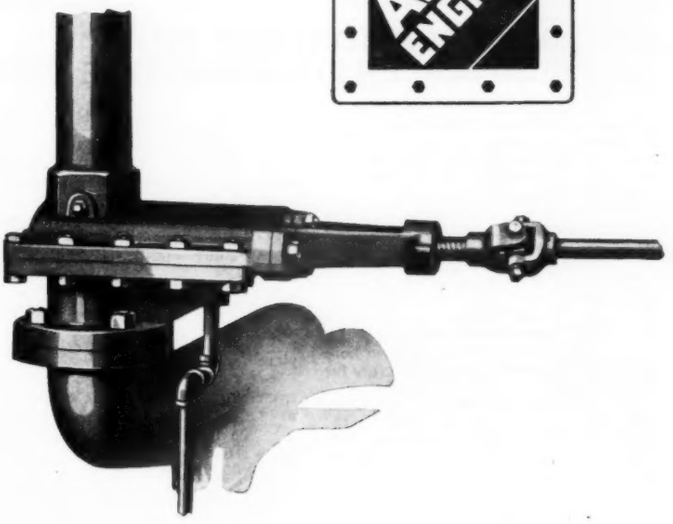
AJAX-
DRILLING

Old Engine with this..... Equipment

They may now be purchased separately for equipping engines already in service. You readily attach either the Safety Throttle Valve, or the Lubricator to any Ajax or other standard steam drilling engine.

You will find it profitable to do so.

AJAX ENGINES



DISTRIBUTED BY
THE NATIONAL SUPPLY COMPANIES

In every oil field

The Ajax-Greenwood Safety Throttle Valve

One of the most fruitful sources of accidents with drilling engines and equipment is the gradual accumulation of steam pressure within the cylinder which turns the engine over unexpectedly.

This valve when closed automatically bleeds cylinders, steam chest and manifold, giving absolute protection against built-up steam pressure.

It will prevent many accidents.

STEAM ENGINES

of a number of minor items, such as internal clearances, external over all dimensions, etc., which when agreed upon will be added to the specifications.

Operating Code

The committee is also engaged at the present time on the formulation of a suggested desirable installation, including complete piping of oil field boilers, and is preparing a code for the operation and care of such boilers. These should be ready for discussion and adoption at the present general meeting of the American Petroleum Institute.

How to Specify A. P. I. Boilers When Ordering

Purchasers of new boilers when ordering A. P. I. boilers should cover in their order the following points:

(a) Specify A. P. I. standard oil field boiler of size desired.

(b) Designate desired dome location, either over firebox or over barrel of boiler.

(c) Specify whether standard list of fittings is desired.

Boilers so purchased will be the best boilers built and will not include extras not needed.

Licensed Manufacturers

Before a manufacturer can warrant his boilers as conforming with the A. P. I. specifications for oil field boilers, he must obtain a license to use the A. P. I. monogram. The following manufacturers have been licensed to stamp their boilers, built according to the A. P. I. specifications, with the A. P. I. monogram.

Baker Iron Works, Los Angeles, Calif.
Donovan Boiler Works, Parkersburg, W. Va.
Farrar & Trefts, Buffalo, N. Y.
General Petroleum Corp., Los Angeles, Calif.
Llewellyn Iron Works, Los Angeles, Calif.
Oil Well Supply Co., Pittsburgh, Pa.
Republic Supply Co., Los Angeles, Calif.
Standard Boiler & Steel Works, Los Angeles, Calif.
The Broderick Co., Muncie, Ind.
Titusville Iron Works Co., Titusville, Pa.

It is suggested that any purchaser usually buying boilers from a manufacturer not on this list, recommend to their supplier that they apply to the A. P. I. Division of Standardization, 1508 Kirby Building, Dallas, Texas, for a license to use the A. P. I. monogram and to secure full information covering the manufacture under A. P. I. specifications.

SECTION 5
Standard Dimensions

5-a. A.P.I. standard boilers shall have the openings and fittings listed in Table No. 2, to be furnished by the manufacturer.

5-b. Fittings listed in Table 3 shall be standard for A.P.I. boilers and shall be furnished at the option of the purchaser.

SECTION 6
Marking

6-a. Boilers manufactured in accordance with these specifications shall be stamped with a steel stencil with the official A.P.I. monogram, and the A.P.I. horsepower rating. No boiler shall be stamped with the A.P.I. monogram which does not comply with these specifications.

B. M. NOWERY

Authority will be granted to use the A.P.I. monogram in accordance with the rules and conditions contained in the appendix.

6-b. All boilers manufactured in accordance with these specifications shall be stamped with the manufacturer's name and identifying mark, as well as any special marking imposed by the A.S.M.E. boiler code, or by the laws of any individual state requiring special marking.

6-c. The A.P.I. monogram shall be applied with a steel stencil directly below the A.S.M.E. or state symbol, size of monogram to be 1-inch high.

SECTION 7
Inspection

7-a. In addition to the inspection provided in the A.S.M.E. code, the inspector representing the purchaser shall have free entry at all times while the work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacture of the material ordered here-

HUGH DONOVAN, JR.
Oil Field Boilers

under. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be conducted so as not to interfere unnecessarily with the operation of the works.

7-b. Where inspector representing the purchaser desires to witness these tests, reasonable notice shall be given of the

J. W. JORDAN
Oil Field Boilers

time at which the run is to be made.

SECTION 8
Rejection

8-a. Boilers manufactured in accordance with these specifications which prove to be defective subsequent to acceptance at manufacturer's works or when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram, or sold as A.P.I. material. When a boiler stamped or marked with the A.P.I. monogram is rejected, such monogram shall be cancelled as follows:

8-b. A steel cancelling stencil, one-half inch square, shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

A.P.I. SPECIFICATIONS FOR OIL FIELD BOILERS (LOCOMOTIVE TYPE)

These specifications were prepared by the special committee on the Standardization of Oil Field Boilers, appointed by the board of directors of the American Petroleum Institute.

The committee, in formulating these specifications, has endeavored to reduce the number of sizes of boilers now in use and to provide for interchangeability of the necessary fittings on boilers of equal horsepower.

SECTION 1
Material Covered

1-a. These specifications apply to boilers of the locomotive or firebox type, for oil field use.

1-b. Chemical and physical properties and tests shall be as specified by the A.S.M.E. boiler code, including any amendments or modifications that may be added from time to time to that code.

1-c. Four sizes of boilers are standard, as follows:

TABLE 1
Sizes

Size Boiler H.P.	Working Pressure Pounds
30	150
50	150
65	175
85	175

SECTION 2
Method of Determining Horsepower

2-a. Ten square feet of heating surface shall constitute one boiler horsepower.

2-b. Area of heating surface is defined as the total area actually in contact with hot gases, and shall be calculated as provided in the A.S.M.E. boiler code.

SECTION 3
Workmanship and Finish

3-a. A.P.I. standard boilers shall be manufactured in accordance with the A.S.M.E. boiler code, including any amendments or modifications that may be added from time to time to that code.

SECTION 4
Special Construction

4-a. The following conditions shall govern in manufacturing A.P.I. standard boilers of the locomotive type:

4-b. The area above the tubes of the smoke box tube sheet shall be stayed with diagonal stays.

4-c. The area above the crown sheet of the outside end sheet of the furnace end of the boiler shall be braced with diagonal stays.

4-d. An 11 by 15-inch manhole to be placed in shell above tubes (except on 30 h.p.).

4-e. Safety valve connections to be placed on side of dome.

4-f. The dome shall be located over the barrel or over the firebox as may be desired.

(The location of the dome over the barrel is preferred in several districts. Other districts prefer the dome located over the firebox. Up to June, 1927, the A.S.M.E. boiler code so limited the size of the dome when located over the barrel that it provided some districts insufficient steam storage space because of their operating conditions. The A.S.M.E. boiler code has been revised allowing the dome when located over the barrel to be 80 per cent of the barrel diameter provided suitable reinforcement is made in the shell under the dome. See P-194, second section Revised A.S.M.E. Boiler Code.)

4-g. Openings for water column shall be 1 inch (optional).

TABLE 3
Standard List of Fittings
To be furnished at the option of the purchaser.

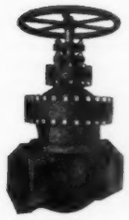
	30 h.p.	50 h.p.	65 h.p.	85 h.p.
40' guy wires	4	4	4	4
Steam gauge 0 lbs. to 300 lbs.—¼" connections	1	1	1	1
Brass radiator siphon with cock and test gauge connections—¼"	1	1	1	1
2" brass pop valve A.S.M.E.	1	2	2	2
Gauge cocks	3-½"	3-½"	3-½"	3-½"
Blow off cocks	1-1½"	1-1½"	1-1½"	1-1½"
Globe valve for feed water	1-1½"	1-1½"	1-1½"	1-1½"
Horizontal check valve feed water	1-1½"	1-1½"	1-1½"	1-1½"
Nipples	3-1½"x2½"	3-1½"x2½"	3-1½"x2½"	3-1½"x2½"
Brass bushings	1-2"x1½"	1-2"x1½"	1-2"x1½"	1-2"x1½"
Water gauge connections	1 Set	1 Set	1 Set	1 Set
Water gauge glass—⅝"x12"	1	1	1	1
Niggerhead	1-3"	1-3"	1-3"	1-3"
Steam outlet nipple—3"x4"	1	1	1	.....

TABLE 2
A.P.I. Standard Boilers
STANDARD OPENINGS AND FITTINGS
(Fittings listed to be furnished by manufacturer.)
LOCOMOTIVE OR FIREBOX TYPE

Item	30 h.p.	50 h.p.	65 h.p.	85 h.p.	REMARKS:
Size of boiler, horsepower					
Size main steam connections	3"	3"	3"	3"	All threaded openings to be standard thread.
Size of boiler feed connections	2"x1½"	2"x1½"	2"x1½"	2"x1½"	Brass bushings all standard thread.
Number boiler feed connections	2	2	2	2	To be located one on each side of boiler.
Size of blow off connections	2"x1½"	2"x1½"	2"x1½"	2"x1½"	Brass bushings, and located in bottom of throat sheet under barrel.
Number blow off openings	1	1	1	1	
Size of gauge cock connections	½"	½"	½"	½"	
Number of gauge cock openings	3	3	3	3	
Size of water gauge openings (for 12-in. glass)	½"	½"	½"	½"	
Circumference of bonnet for stack	70"	82"	82"	87"	
Diameter of stack	22"	26"	25"	28"	
Length of stack	28'	28'	28'	28'	Two sections of approximately equal length, flanged, and a flange at top.
Stack material, gauge	No. 12	No. 12	No. 12	No. 12	
Sizes all hand hole plates	3½"x4½"	3½"x4½"	3½"x4½"	3½"x4½"	See note below regarding location of hand hole plates.
Number of hand hole plates	10	10	10	10	
Size manhole plate	.....	11"x15"	11"x15"	11"x15"	To be placed in shell above tube.
Number manhole plate	.....	1	1	1	

Note: Location of hand hole plates—4 in outside wrapper sheet on a line with crown sheet, 2 in throat sheet, 2 in front outside furnace sheet as close to mud rim as possible, 1 below tubes in rear tube sheet, 1 in front outside furnace sheet on a line with crown sheet.

It pays to be safe



Appearances are deceiving especially in drilling valves where the tiniest flaw, unseen to the eye, may cause a break at that critical time when your well comes in—rarin' to go.

This can't happen to a Kerotest—because every valve is laboratory tested and certified before it is shipped to the oil fields.

The famous kerosene test searches out the most minute flaw, and enables us to check out any defective valves before leaving the factory.

That's why every Kerotest Valve in the field is a 100% performer. They never fail on the wildest wells.

KEROTEST MANUFACTURING COMPANY

Pittsburgh, Penna.

Carried in Stock and Sold by

GRINNELL CO. OF THE PACIFIC
Los Angeles San Francisco

NORVELL-WILDER HARDWARE CO.
Houston Beaumont
Shreveport Fort Worth

OIL WELL SUPPLY CO.
Oklahoma Kansas Colorado Wyoming

Export Distributors

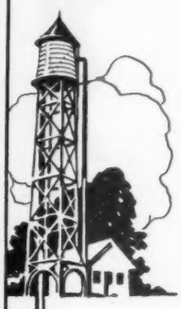
OIL WELL SUPPLY CO.
Pittsburgh New York Tampico London

VALVES KEROTEST FITTINGS

REGISTERED U.S. PAT. OFF.

APPLICATIONS

This is one of a series of advertisements describing the proper application of alternating current motor types. Complete series will gladly be sent upon request. Wagner standard squirrel cage motors, suitable for across-the-line starting in ratings up to 20-hp.



A pump or a motor problem ... *which?*

A LARGE manufacturer secured his water supply from a pump located so far from the main power station that it was not under the immediate supervision of its operator. There was serious trouble keeping this pump in operation, for the automatic starter had to be within 10 feet of the pump motor. Thus every time the protective devices opened the circuit it was necessary to visit the pump house.

This manufacturer put his problem up to Wagner. Wagner installed its Starterless Motor, which having no starter could be connected directly across-the-line. Across-the-line starters with low voltage protection and overload trip coils were installed in the power house from which the motor was supplied instead of an automatic starter in the distant pump house.

The motor is normally started and stopped by a float switch and in emergencies the overload relays in the power house open the lines leading to the pump house. When normal conditions are re-established the operator resets the relays and the float switch in the distant pump house begins once more its automatic control of the motor.

STARTERLESS MOTOR APPLICATIONS

SEWAGE PUMPS—An excellent application for Starterless Motors because no starter is required and motors have a high starting torque.

RAILWAY WATER TOWER PUMPS · AIR COMPRESSORS · ICE MACHINES

CONSTRUCTION WORK—because of the simplicity of the starting operation.

Wagner Quality

WAGNER ELECTRIC CORPORATION—6400 Plymouth Avenue—St. Louis, U. S. A.

Products: MOTORS—Single, Polyphase and Fynn-Weichsel Motors TRANSFORMERS—Power and distribution
FANS—Desk, Wall and Ceiling types

61-7637-1

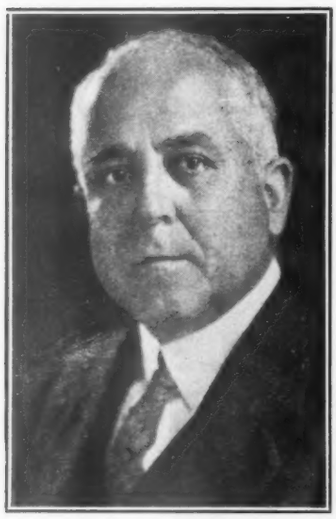
A.P.I. SPECIFICATIONS FOR OIL TUBULAR GOODS

(Continued from Page 162)

of tests shall be determined in the same manner as when taken from the finished pipe.

Retests

11-a. If the result of the physical tests of any lot or heat does not conform to the requirements specified in Paragraph 5-a, retests of two additional lengths or pieces of skelp shall be made, each of which shall conform to the requirements specified.



CHARLES T. RESSLER
Tubular Goods

11-b. If any specimen shows defective machining and develops flaws, it may be discarded and another specimen substituted. If the elongation of any tension test specimen is less than that specified and any part of the fracture is outside of the middle third of the gauge length as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

Section 4—Standard Weights

12-a. The standard weights for oil country tubular material of A.P.I. sizes are given in tables appended.

Permissible Variations

12-b. The weight of any length of pipe shall not vary more than 3½ per cent under or 6½ per cent over that specified; but the carload weight shall not be more than 1¾ per cent under the nominal weight. On upset pipe the nominal weight is based on 20-foot lengths and due allowance must be made for longer lengths when same are furnished. (The mills will prepare tables for the guidance of inspectors). Each joint shall be weighed separately with couplings screwed on, but with thread protector removed. In arriving at car load weight proper allowances are to be made for thread protectors.

Lengths

13-a. Unless otherwise specified pipe shall be furnished as to minimum lengths in accordance with the following:

13-b. Tubing, casing and drive pipe shall have an average length of not less than 20 feet for every car load shipped.

13-c. On tubing not over 5 per cent of any car load shall be under 20 feet in length, with a minimum of 18 feet for the length of any joint.

13-d. On casing and drive pipe, not over 5 per cent of any car load shall be under 18 feet in length, with a minimum of 16 feet for the length of any joint. (See footnote.)

13-e. Drill pipe may be manufactured in two average lengths, of 20 feet or 28 feet. On the 20-foot average length not more than 5 per cent of any car load shall be under 20 feet in length, with a minimum of 18 feet, and no single joint shall exceed 22 feet. On the 28-foot average length not more than 5 per cent of any car load shall be under 27 feet, with a minimum of 26 feet, and no single joint shall exceed 30 feet.

13-f. Jointers (two short lengths connected by couplings), the minimum length of the shorter piece to be 5 feet, may be shipped to a maximum of 5 per cent of the order for line, casing and drive pipe. No jointers shall be shipped on tubing or rotary drill pipe orders.

Footnote—It is the sense of this committee that within a reasonable time the specifications as to the lengths of joints will be changed to give longer average lengths on all joints, and a longer minimum length for any joint of tubular goods, included in this specification; that great advantages could be effected for the consumer as well as the manufacturer if the lengths of tubular goods used in the oil business averaged 30 feet; and that due consideration should be given this recommendation by the pipe mills, as they have opportunities to make changes in their furnaces.

Section 5—Workmanship and Finish

14-a. All skelp entering into welded oil field tubular goods, whether casing, tubing or drill pipe, must be scarfed.

14-b. For pipe 1½-inch or under in nominal inside diameter, the outside diameter at any point shall not vary more than 1/64 inch over nor more than 1/32 inch under the standard size. For pipe 2-inch or over in nominal inside diameter, the outside diameter shall not vary more than 1 per cent over or under the standard size. The wall thickness of welded and seamless pipe shall not be more than 12½ per cent under the nominal wall thickness at any point.

14-c. The finished pipe shall be reasonably straight and free from injurious defects, such as burnt material, bad welds, sand pits, ball cuts, pits, cinder spots, liquor marks, blisters, slivers and laminations. Seamless pipe shall also be free from injurious seams. When the depth of sand pits, liquor marks and cinder spots is in excess of 12½ per cent of the nominal wall thickness they shall be considered injurious defects; welding or patching of such defects will not be permitted. The threading on the pipe must be free from tears, shoulders, cuts or any defects which may break the continuity of the thread. In the case of plain end pipe where rubber joints are to be used, the ends for a distance of 8 inches must be free from roll cuts, indentations or raised points which will impair the tightness of the joints.

Ends

15-a. Unless otherwise specified, pipe shall conform to the following regular practice.

15-b. Each end of pipe shall be threaded and reamed to remove all burrs. Ends of drive pipe shall be cut off square with pipe axis and so threaded as to butt true when screwed into coupling.

ARTHUR J. CARR
Tubular Goods

Threads and Gauges

15-c. The threads shall be in accordance with the American standard (as illustrated in thread and gauge tables appended), and cut so as to make a tight joint when the pipe is tested at the mill to the specified internal hydrostatic pressure. The variation from the standard, when tested with the standard working gauge, shall not exceed a maximum of one turn either way on eight thread, three-quarter-inch taper, and 1½ turns either way on 10-thread and 11½-thread pipe. For thread diameters of A.P.I. tubular material, see thread tables appended.

15-d. The crests and roots of all drill pipe threads shall be rounded, the radius at the crests being slightly greater than that at the root, to insure full flank contact, as illustrated and specified in Figure 4.

15-e. Threads in couplings and on casing and pipe shall be so nearly alike in form and size, and so well finished, that joints can be screwed together with suitable lubricant, far enough to make a tight joint, and unscrewed four times without injury to the threads. At the discretion of inspector, where the purchaser is represented by an inspector, at least one joint may be so tested out of a lot of 100 or more after joints have been made up at coupling screwing machine.

F. N. SPELLER
Tubular Goods

15-f. Pipe shall not be rounded out by hammering in order to get a full thread. Pipe having more than six black threads along the taper, not including the vanishing threads, will be rejected. Black threads should not be confused with imperfect threads such as torn, shaved or broken threads.

15-g. Each manufacturer of A.P.I. tubular threaded material shall provide himself with plug and ring reference gauges which have been manufactured in accordance with the gauge tables appended; such reference gauges to be checked and certified by the Bureau of Standards in Washington. Each certificate shall identify a particular gauge by a serial number, and date of certification marked on the gauge, and state its errors, if any, in pitch diameter, lead, taper, and angle of thread. The reference gauge will be a taper threaded plug gauge. The errors on new reference gauges shall not exceed the limits contained in gauge specifications appended.

15-h. A worn plug gauge which is within these limits except for pitch diameter, which varies from the table by not more than one turn may be used provided such error is marked on the gauge and proper allowance made for such error when using gauge. Form of thread for gauges, etc., shall conform to the practice specified in gauge tables appended. Guaging shall be done to conform with A.P.I. gauging practice defined herein.

Taper Tests

15-i. The taper of threads on both pipe and couplings shall be tested by approved methods at intervals sufficient to insure that taps and dies are in proper adjustment. (See footnote).

The variations in taper shall not exceed the following limits:

When taper per foot is specified as:

	3/16"	3/8"	3/4"
Maximum taper ..	1/4"	7/16"	13/16"
Minimum taper ..	5/32"	11/32"	23/32"

Footnote—With reference to the permissible variation in tapers, it was agreed that we accept for the present the tolerance advocated by the manufacturers, viz.:

One-eighth-inch over and one-thirty-second-inch under per foot of length for all tubular goods.

In the meantime this will give some of the operators an apportunity to check this tolerance in actual practice. It is distinctly understood that this tolerance is subject to revision at some future date. It will also give the mills an opportunity to get in shape to comply with closer tolerances later, should they be found desirable.

Thread Protectors

15-j. Solid tapped rings or split couplings, or other protectors to be approved by the American Petroleum Institute, shall be provided as thread protectors on all sizes 2 inches and larger, and shall be made and finished so as to prevent water from accumulating around the threads on the pipe. The thickness of the protectors shall be approximately that of the pipe on which they are used, unless of such form and make as to give equal or greater protection to the end of the pipe and to the thread. On sizes under 2 inches for export shipment, the end shall be burlapped.

Couplings

15-k. Each length of threaded pipe shall be provided with one coupling, having clean-cut threads of such a pitch diameter as to make a tight joint. Couplings may be made of wrought iron or steel, seamless or welded, and shall be free from blisters, pits, cinder marks and any other injurious defects that would impair the efficiency of the coupling and break the continuity of the thread. When couplings are made of steel they shall be electro-plated on the threads, heat treated by some other method of manufacture which will minimize the chance of galling.

15-l. The ends of couplings to be faced true at right angles to the axis and outside beveled so as to prevent catching on the ends of the joints of pipe through which they pass; but enough thickness should be left at the end of coupling to safely support the weight of the pipe on the elevator.

15-m. No tapers of couplings to be secured by expanding.

15-n. When couplings are screwed on at the mill a high-grade lubricant shall be applied to coupling and pipe threads before making up the joint; and to prevent rust, all exposed threads shall be thoroughly greased.

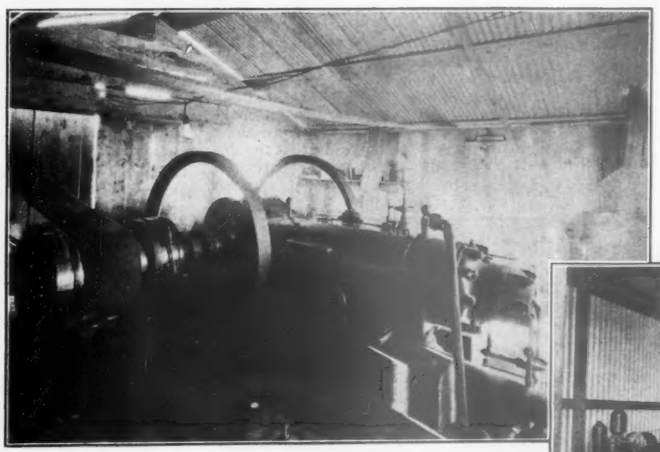
Alignment Test

15-o. The couplings shall be tapped concentric so that the axes of the threads of the two ends are closely in line. Couplings shall be tested for alignment by screwing onto a threaded piece carefully centered in a lathe; in the outer end of coupling is screwed a lathe-turned piece which will give a measured length of about 1 foot on which the alignment of

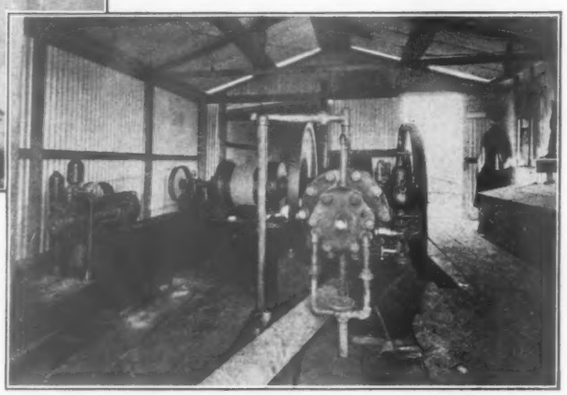
M. T. RATHVON
Tubular Goods

FRANKLIN VALVELESS

For Any Job



Two of the Franklin Valveless Drilling Engines on location at McCamey, Texas. Gibson Brothers, the Drilling Contractors, have four Franklins in service at McCamey. State they have given wonderful service and expect to buy more.

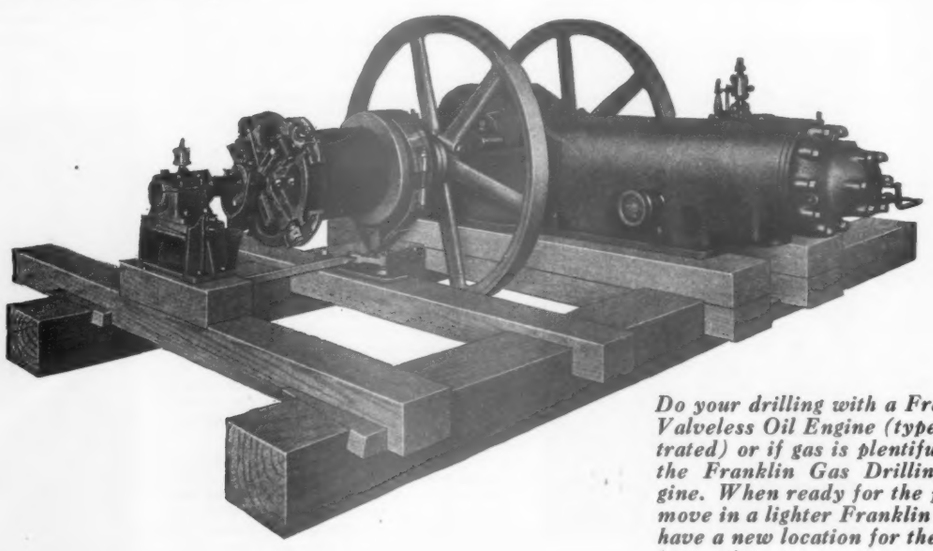


Drilling

If it's speed and economy you're after, take a tip from veteran contractors and hitch your tools to a Franklin Valveless.

This dependable, flexible power plant is making a name for itself and a reputation for its users in every worth while field. By *speed* we don't mean number of revolutions per minute, but one-truck transportation, easy installation, quick starting and absolute dependability month after month with the least amount of attention. Those are the advantages that *count,* whether you're contractor, superintendent or owner.

As for expenses—a Franklin Valveless (oil or gas) costs less to run than a flivver, and repair costs aren't worth mentioning.



Do your drilling with a Franklin Valveless Oil Engine (type illustrated) or if gas is plentiful with the Franklin Gas Drilling Engine. When ready for the pumps move in a lighter Franklin if you have a new location for the drilling engine.

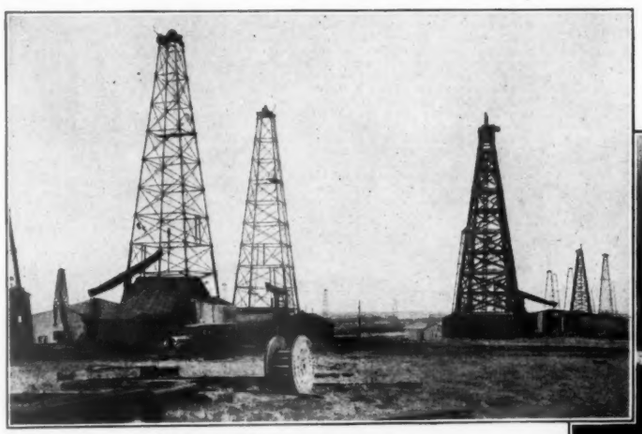
Distribu te

OIL WELL SUP

Branches in A

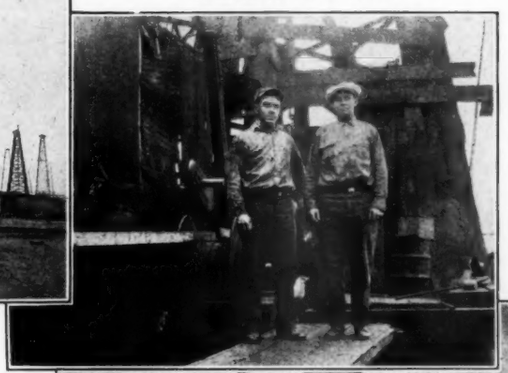
OIL AND GAS ENGINES

In Any Field



T. B. Slick—Endicott Lease, Tonkawa, Okla. Seven Franklins in service.

J. R. Lawson—Tool dresser
W. C. Milam—Driller
on Endicott 2 E Well.



T. B. Simmons, Tool dresser, and Geo. I. Miller, Driller, with 40 H.P. Franklin Gas Engine.

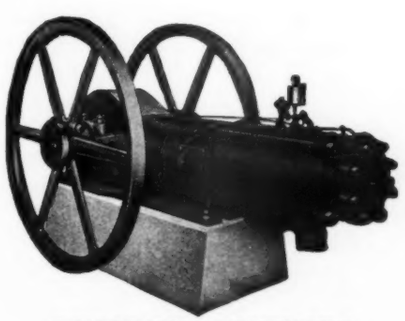
Pumping

When T. B. Slick of Tonkawa, Okla., was through drilling, he found it economical to transfer those power plants to new locations and replace them with light Franklin Gas Pumping Engines. The pumpers were installed right on the old foundations without so much as changing a single bolt hole!

Swabbing

Just because Franklin Pumping Engines are light and economical, don't get the idea that they aren't powerful. T. B. Slick, whose lease and crews are shown above, has seven 40 H.P. Franklins in this field, and four of them have been used continuously on swabbing jobs for the past year. Mr. Slick reports—"no trouble, no repairs to date."

FRANKLIN VALVELESS
ENGINE COMPANY
Franklin, Penna.



PUMPING ENGINES

25-30 H.P. and 40 H.P. Franklin Gas Engines are ideal for pumping and powerful enough to stand up under swabbing. These engines can each be mounted on the same block as the Drilling Engine without so much as changing a bolt.

ted By
PLY COMPANY
All Oil Fields

the coupling threads may be determined by an alignment indicator when rotated in the lathe. Other approved means of measuring alignment may be used. Couplings shall be in line within three-fourths inch in a length of 20 feet on all tubular goods except drill pipe. Couplings on drill pipe shall be in line within one-half inch in a length of 20 feet. At least one coupling may be taken from each lot of 100 or less, but this shall be left to the discretion of the inspector, where the purchaser is represented by an inspector. In case this coupling fails, two more couplings may be taken from the same lot, each of which must be within the alignment specified, otherwise the lot shall be rejected. In any case the manufacturer may test rejected couplings individually if desired.

Marking

16-a. The length, the test pressure in pounds and class of material shall be stenciled on each length of pipe, and on sizes 6 inches and larger, except dipped or coated pipe, the weight of each length shall be stenciled. Approved abbreviations may be used. Weight per foot and A.P.I. monogram to be stamped with steel stencils on each joint 1 foot from coupling on the shop end. The A.P.I. monogram shall also be stamped with steel stencil on all couplings. The size of monogram to be one-quarter inch high on all sizes of pipe; three-eighths inch high on couplings for pipe sizes from 2 inches to 6⅝ inches, and one-half inch high on couplings for pipe sizes over 6⅝ inches. (The upper and lower cross bar on the letter "I" in the A.P.I. monogram may be omitted when applied to pipe.

16-b. All pipe manufactured in accordance with these specifications shall be marked, by stamping or rolling, with the manufacturer's private identifying mark.

Section 6—Inspection and Rejection

Inspection

17-a. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacture of the pipe ordered. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the pipe is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

17-b. Where inspector representing purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

Rejection

18. Material which shows injurious defects subsequent to acceptance at manufacturer's works, or which proves defective when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A.P.I. pipe, except where said pipe fails to comply with the weight specification alone, in which case it may be sold under a weight specification with which it does comply. When pipe stamped with the A.P.I. monogram is rejected, a canceling stencil, one-half inch square, per the following figure, shall be applied to such monogram in the following manner: the canceling stencil shall be applied twice, first with the lines of the stencil parallel to the axis of the pipe, the stencil then turned 90 degrees, and applied the second time.

A.P.I. Standard Casing

NOTES TO TABLE 1

*Sizes for California and similar territory. These are standard at present. Dimensions and weights copied from lists now in use and "size" changed to outside diameter.

†To ascertain setting depth with safety factor of two with liquids heavier than fresh water divide the tabular number of feet by specific gravity of heavier liquid, or multiply by 8⅓ and divide product by weight per gallon of heavier liquid.

‡To ascertain setting depth for any other factor than two multiply the tabular number of feet by two and divide the product by the desired factor.

Taper of threads on 10-thread pipe three-eighths inch diameter per foot of length.

Taper of threads on 8-thread pipe three-quarter inch diameter per foot of length.

Assuming 30 per cent greater strength to resist collapse for high carbon seamless steel:

4½-inch, 16-pound casing would set 7,000 feet with a factor of safety of 2.

5⅝-inch, 23-pound casing would set 7,000 feet with a factor of safety of 1.85.

6⅝-inch, 28-pound casing would set 6,100 feet with the factor of safety of 2.

8⅝-inch, 40-pound casing would set 6,000 feet with a factor of safety of 1.82.

When joints are screwed tight the ends of casing shall be five-eighths inch from center of coupling and, when in this position, the outside diameter of thread at end of coupling to be that of the nominal outside diameter of casing. Beyond the threads at the end of the coupling there shall be 2 threads perfect at the bottom on 8-thread and 3 threads on 10-thread casing. A slight variation from this provision is permitted in the California sizes as follows:

Sizes—	Distance End of Pipe from Cen. of Coupling	No. of Threads Perfect at Bottom Exposed Beyond the Threads in the Coupling
4½" O.D.	..5625"	2
6⅝" O.D.	..6125"	2
8⅝" O.D.	..6125"	2
9 " O.D.	..6875"	3
11¾" O.D.	..6875"	3

Extreme depth of recess in couplings, including chamfer, not to exceed five-eighths inch on 8-thread and seven-tenths inch on 10-thread.

Bevel on coupling recess to be 25 degrees to line parallel to axis of casing.

(Continued on Page 252)

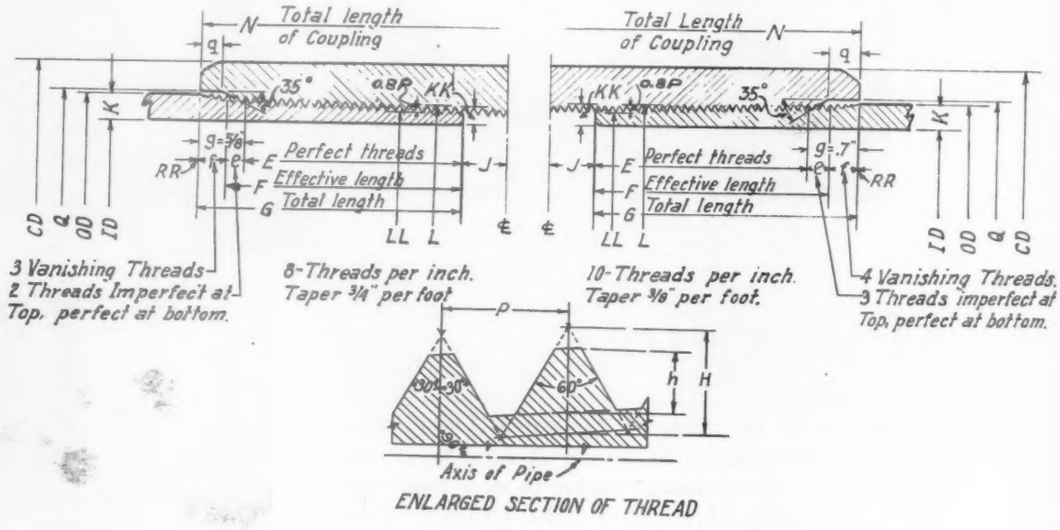


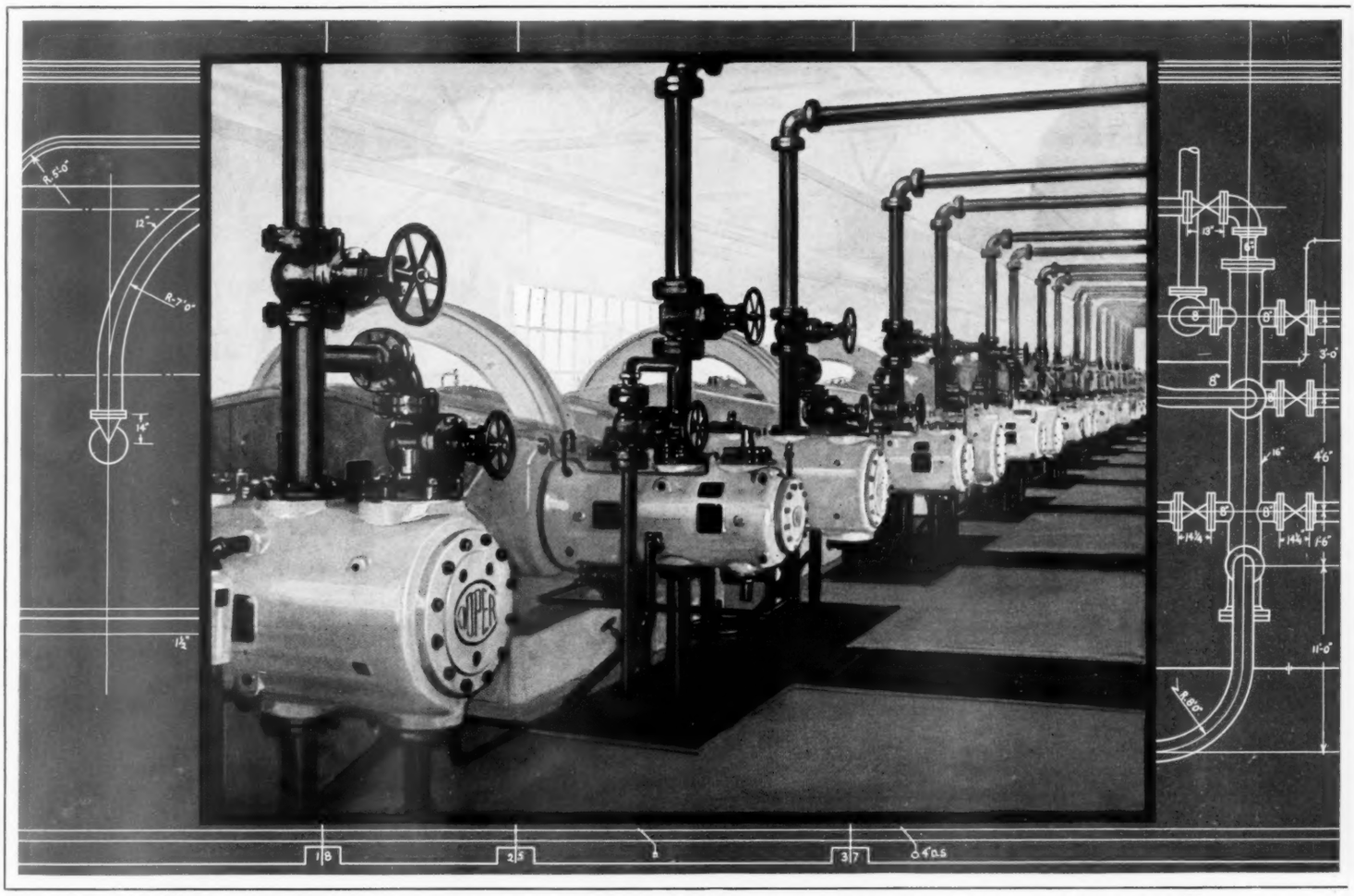
Figure 1

TABLE 1.—AMERICAN PETROLEUM INSTITUTE CASING

"Size" of A.P.I. Casing Indicates OUTSIDE Diameter. All Dimensions in Inches at 68 Degrees Fahrenheit.

Size	Diameters			Thickness			Wt. per Foot, Lbs.				Couplings						Test Pressure in Pounds						
																	Steel		Open Hearth Iron		Wrought Iron		
	External "O. D."	Internal "I. D."	Upset—"U. D."	"K"	Threads, Number per Inch—"R"	Taper, Inches per foot—"b"	Plain Ends	Threads and Couplings	Upset casing without Couplings	Upset casing with threads and Couplings	Diameter for Casing not Upset—"C. D."	Length—"N"	Diameter for Upset Casing "C. D."	Width of Bearing Face—"E"	Depth of Recess—"q"	Diameter of Recess—"Q"	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Depth in ft. for Compression Factor of safety of 2 for Lap Weld Steel.†
*4½	4.75	4.082	....	.334	10	¾	15.752	16.00	....	....	5.364	6⅝	....	3/16"	5/8	4.84375	2250	2000	2000	1750	1700	1500	5420
4½	4.75	4.082	5.	.334	10	¾	15.752	....	16.03	16.25	....	7	5.65	3/16"	7/16	5.09375	2250	2000	2000	1750	1700	1500	5420
5⅝	5.75	5.29	....	.23	10	¾	13.559	14.00	....	....	6.5625	7½	....	1/4 "	7/16	5.84375	1300	1150	1150	1000	1000	900	2390
5⅝	5.75	5.19	....	.28	10	¾	16.357	17.00	....	....	6.5625	7½	....	1/4 "	7/16	5.84375	1600	1400	1400	1250	1200	1050	3260
5⅝	5.75	5.09	....	.33	10	¾	19.102	19.50	....	....	6.5625	7½	....	1/4 "	7/16	5.84375	1850	1600	1600	1450	1400	1250	4130
5⅝	5.75	5.09	6.	.33	10	¾	19.102	....	19.36	20.00	....	8½	6.75	1/4 "	7/16	6.09375	1850	1600	1600	1450	1400	1250	4130
5⅝	5.75	4.99	....	.38	10	¾	21.793	22.50	....	....	6.5625	7½	....	1/4 "	7/16	5.84375	2150	1850	1850	1650	1600	1450	5000
5⅝	5.75	4.99	6.	.38	10	¾	21.793	....	22.16	23.00	....	8½	6.75	1/4 "	7/16	6.09575	2150	1850	1850	1650	1600	1450	5000
*6⅝	6.625	6.049	....	.288	10	¾	19.491	20.00	....	....	7.390	7⅝	....	1/4 "	5/8	6.71875	1400	1250	1250	1100	1050	950	2740
*6⅝	6.625	5.921	....	.352	10	¾	23.582	24.00	....	....	7.390	7⅝	....	1/4 "	5/8	6.71875	1700	1500	1500	1350	1300	1150	3710
*6⅝	6.625	5.855	....	.385	10	¾	25.658	26.00	....	....	7.390	7⅝	....	1/4 "	5/8	6.71875	1900	1650	1650	1450	1400	1250	4200
*6⅝	6.625	5.791	....	.417	10	¾	27.648	28.00	....	....	7.390	7⅝	....	1/4 "	5/8	6.71875	2050	1800	1800	1600	1550	1350	4690
8⅛	8.125	7.485	....	.32	10	¾	26.674	28.00	....	....	9.0937	8½	....	1/4 "	7/16	8.21875	1250	1100	1100	1000	950	850	2330
8⅛	8.125	7.385	....	.37	10	¾	30.645	32.00	....	....	9.0937	8½	....	1/4 "	7/16	8.21875	1500	1300	1300	1150	1150	1000	2940
8⅛	8.125	7.285	....	.42	10	¾	34.562	35.50	....	....	9.0937	8½	....	1/4 "	7/16	8.21875	1700	1500	1500	1300	1250	1150	3560
8⅛	8.125	7.185	....	.47	10	¾	38.425	39.50	....	....	9.0937	8½	....	1/4 "	7/16	8.21875	1900	1650	1650	1450	1400	1250	4180
8⅛	8.125	7.185	8.375	.47	10	¾	38.425	....	38.80	40.00	....	8½	9.30	1/4 "	7/16	8.46875	1900	1650	1650	1450	1400	1250	4180
*8⅝	8.625	8.017	....	.304	10	¾	27.016	28.00	....	....	9.593	8½	....	9/32"	5/8	8.71875	1150	1000	1000	900	850	750	1920
*8⅝	8.625	7.921	....	.352	10	¾	31.101	32.00	....	....	9.593	8½	....	9/32"	5/8	8.71875	1350	1200	1200	1050	1000	900	2470
*8⅝	8.625	7.825	....	.400	10	¾	35.137	36.00	....	....	9.593	8½	....	9/32"	5/8	8.71875	1500	1300	1300	1150	1150	1000	3030
*8⅝	8.625	7.775	....	.425	10	¾	37.220	38.00	....	....	9.593	8½	....	9/32"	5/8	8.71875	1600	1400	1400	1250	1200	1050	3320
*8⅝	8.625	7.651	....	.487	10	¾	42.327	43.00	....	....	9.593	8½	....	9/32"	5/8	8.71875	1800	1600	1600	1400	1350	1200	4040
*9	9.000	8.290	....	.355	8	¾	32.777	34.00	....	....	10.010	8½	....	9/32"	5/8	9.09375	1300	1100	1100	1000	950	850	2350
*9	9.000	8.196	....	.402	8	¾	36.914	38.00	....	....	10.010	8½	....	9/32"	5/8	9.09375	1450	1250	1250	1100	1100	950	2870
*9	9.000	8.150	....	.425	8	¾	38.922	40.00	....	....	10.010	8⅝	....	9/32"	5/8	9.09375	1500	1300	1300	1150	1150	1000	3120
*9	9.000	8.032	....	.484	8	¾	44.020	45.00	....	....	10.010	8½	....	9/32"	5/8	9.09375	1700	1500	1500	1350	1300	1150	3780
10¾	10.75	10.05	....	.35	8	¾	38.875	40.50	....	....	11.75	8½	....	9/32"	11/32	10.84375	1100	950	950	850	800	750	1650
10¾	10.75	9.95	....	.40	8	¾	44.215	45.50	....	....	11.75	8½	....	9/32"	11/32	10.84375	1200	1050	1050	950	900	800	2100
10¾	10.75	9.85	....	.45	8	¾	49.502	51.00	....	....	11.75	8½	....	9/32"	11/32	10.84375	1350	1200	1200	1050	1050	900	2580
10¾	10.75	9.76	....	.495	8	¾	54.214	55.50	....	....	11.75	8½	....	9/32"	11/32	10.84375	1500	1300	1300	1150	1150	1000	3000
*11¾	11.75	11.000	....	.375	8	¾	45.557	47.00	....	....	12.866	8⅛	....	9/32"	5/8	11.84375	1050	900	900	800	800	700	1590
*11¾	11.75	10.880	....	.435	8	¾	52.568	54.00	....	....	12.866	8⅛	....	9/32"	5/8	11.84375	1200	1050	1050	950	900	800	2100
*11¾	11.75	10.772	....	.489	8	¾	58.811	60.00	....	....	12.866	8⅛	....	9/32"	5/8	11.84375	1350	1200	1200	1050	1050	900	2560
13⅜	13.375	12.715	....	.33	8	¾	45.976	48.00	....	....	14.375	9	....	5/16"	11/32	13.46875	800	700	700	650	600	550	860
13⅜	13.375	12.615	....	.38	8	¾	52.739	54.50	....	....	14.375	9	....	5/16"	11/32	13.46875	900	800	800	700	700	600	1230
13⅜	13.375	12.515	....	.43	8	¾	59.449	61.00	....	....	14.375	9	....	5/16"	11/32	13.46875	1050	900	900	800	800	700	1610
13⅜	13.375	12.415	....	.48	8	¾	66.105	68.00	....	....	14.375	9	....	5/16"	11/32	13.46875	1200	1050	1050	950	950	800	2000
16	16.00	15.375	....	.3125	8	¾	52.357	55.00	....	....	17.00	9	....	5/16"	11/32	16.09375	650	550	550	500	500	450	425
16	16.00	15.250	....	.375	8	¾	62.579	65.00	....	....	17.00	9	....	5/16"	11/32	16.09375	750	650	650	600	600	500	740
16	16.00	15.125	....	.4375	8	¾	72.716	75.00	....	....	17.00	9	....	5/16"	11/32	16.09375	900	800	800	700	650	600	1130
16	16.00	15.010	....	.495	8	¾	81.969	84.00	....	....	17.00	9	....	5/16"	11/32	16.09375	1000	900	900	800	750	700	1500
18⅝	18.625	17.855	....	.385	8	¾	75.00	78.00	....	....	19.75	9	....	3/8 "	11/32	18.71875	700	600	600	550	500	450	510
18⅝	18.625	17.755	....	.435	8	¾	84.508	87.50	....	....	19.75	9	....	3/8 "	11/32	18.71875	750	650	650	600	600	500	730
18⅝	18.625	17.655	....	.485	8	¾	93.962	96.50	....	....	19.75	9	....	3/8 "	11/32	18.71875	850	750	750	650	650	600	1000
21½	21.50	20.71	....	.395	8	¾	89.034	92.50	....	....	22.625	9	....	3/8 "	11/32	21.59375	600	550	550	500	450	400	360
21½	21.50	20.61	....	.445	8	¾	100.067	103.00	....	....	22.625	9	....	3/8 "	11/32	21.59375	700	600	600	550	500	450	510
21½	21.50	20.51	....	.495	8	¾	111.046	114.00	....	....	22.625	9	....	3/8 "	11/32	21.59375	750	650	650	600	600	500	700
24½	24.50	23.85	....	.325	8	¾	83.912	88.00	....	....	25.625	9	....	3/8 "	11/32	24.59375	450	400	400	350	350	300	130
24½	24.50	23.75	....	.375	8	¾	96.622	100.50	....	....	25.625	9	....	3/8 "	11/32	24.59375	500	450	450	400	400	350	200
24½	24.50	23.65	....	.425	8	¾	109.278	113.00	....	....	25.625	9	....	3/8 "	11/32	24.59375	600	500	500	450	450	400	300

150 Pounds Pressure **CRANE VALVES** 2500 Pounds Pressure



Gas booster pumping station of the SINCLAIR OIL & GAS CO., *Garber, Okla.* CRANE *valves and fittings used throughout; chosen for their standard of quality, characteristic of all* CRANE *products down to the humble sink faucet*

The battle of Benninghoff Run

Through the sucking mud of Oil Creek valley, primitive tank wagons by the thousand slithered, sank hub deep, creaked on unendingly. It was 1865, and oil was on the move from the wells to the refineries.

Looking at the straining horses, mules, and oxen, in that Pennsylvania quagmire, a dreamer visioned a more practical, economical way to transport oil. Why not, he reasoned, send it through pipes like water?

The completion of his first pipe-line, from Benninghoff Run to Shaffer, marked an uprising of thousands of teamsters whose livelihood it threatened. They overpowered the lines' defenders, burned down the storage tanks, tore up the pipes.

But they could not destroy the power of that "new-fangled idea." It was rooted too deeply in economic necessity. Today, these arteries of the oil industry are over 85,000 miles long. Through forest and swamp, hanging from canyon walls, over hills and under rivers, they carry 2,000,000 barrels of crude oil daily. And another 161,800 miles of pipe-lines, aided by booster stations, convey many billion cubic feet of natural and manufactured gas.

From the very beginning, Crane has supplied valves, fittings, and piping materials, for every requirement of the oil and gas industries.

CRANE

PIPING MATERIALS TO CONVEY AND CONTROL OIL, GAS, STEAM, AND LIQUI

WRITE CRANE CO., GENERAL OFFICES, 836 S. MICHIGAN AVENUE, CHICAGO

Branches and Sales Offices in One Hundred and Sixty-two Cities

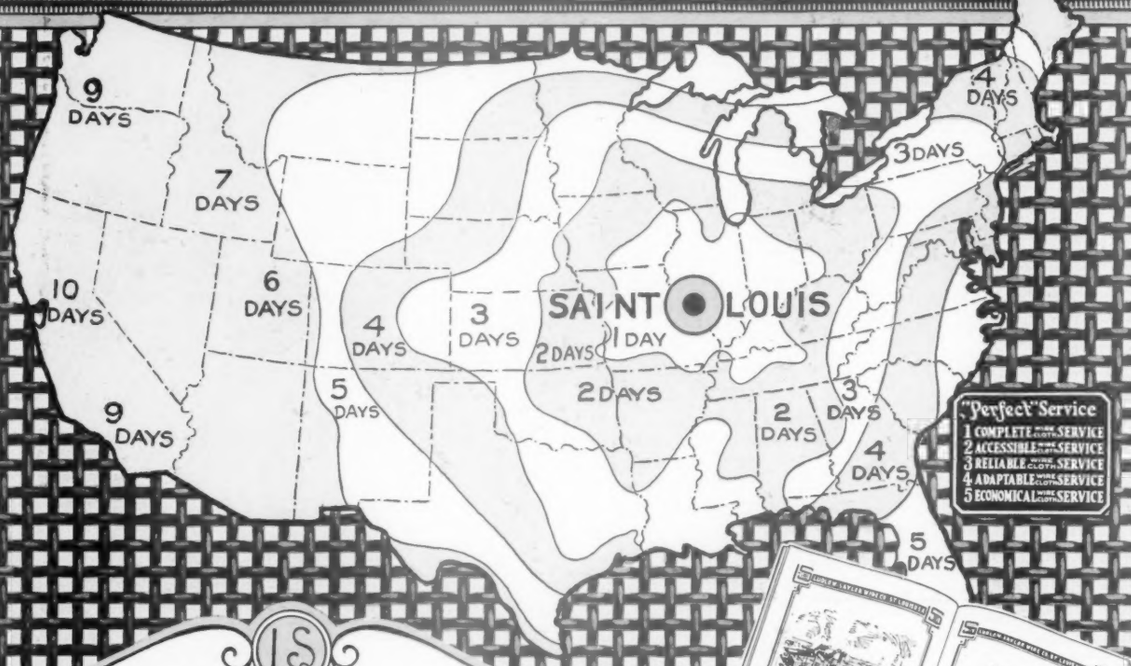
National Exhibit Rooms: Chicago, New York, Atlantic City, San Francisco, and Montreal

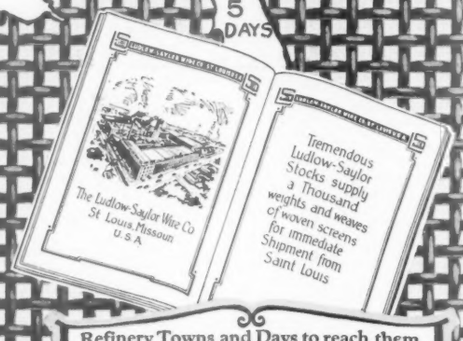
Works: Chicago, Bridgeport, Birmingham, Chattanooga, Trenton; Montreal, and St. Johns, Quebec; Ipswich, England

CRANE EXPORT CORPORATION: NEW YORK, SAN FRANCISCO, MEXICO CITY, HAVANA
CRANE LIMITED: CRANE BUILDING, 1170 BEAVER HALL SQUARE, MONTREAL
CRANE-BENNETT, LTD., LONDON
CIE CRANE: PARIS, BRUSSELS

Nearest to your Needs

Quickest Shipment—Fewest Days in Transit




The Ludlow-Saylor Wire Co
St. Louis, Missouri
U. S. A.
Tremendous Ludlow-Saylor Stocks supply a thousand weights and weaves of woven screens for immediate Shipment from Saint Louis

LUDLOW-SAYLOR, *St. Louis*

means Accessible Wire Cloth Service

SCREEN USERS of all America depend upon St. Louis for complete, reliable, economical and quickly accessible Wire Cloth Service.

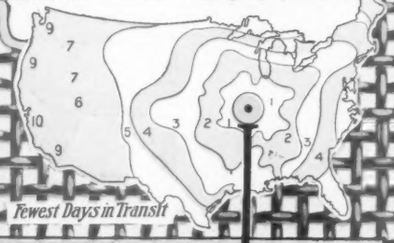
Tremendous Ludlow-Saylor Stocks supply a thousand weights and weaves of woven screens, in standard widths. Ordinary specifications are shipped same day order is received. Modern looms make any special screen in the promptest, best and least expensive way.

Package Car Delivery from St. Louis Puts Ludlow-Saylor Service Nearest to Your Needs. Over 26 great Railway systems, 1200 Package Cars leave St. Louis daily, for expedited deliveries to all America—regular freight rates—no extras—fewest days in transit.

Mark all Requisitions—
"By Package Car from St. Louis."

Refinery Towns and Days to reach them
By Package Car from St. Louis
Regular freight rates—no extras

City	Days	City	Days
Alexandria, La.	3	Kansas City, Mo.	1
Ardmore, Okla.	3	Lexington, Ky.	2
Amarillo, Texas	4	Louisville, Ky.	1
Baltimore, Md.	4	New Orleans, La.	2
Bartlesville, Okla.	2	Okmulgee, Okla.	3
Baton Rouge, La.	3	Owensboro, Ky.	1
Beaumont, Texas	4	Parkersburg, W. Va.	3
Butte, Mont.	6	Philadelphia, Pa.	4
Camden, Ark.	2	Pittsburgh, Pa.	3
Cincinnati, Ohio	2	Salt Lake City	5
Cleveland, Ohio	2	Shreveport, La.	3
Columbus, Ohio	2	Tampa, Fla.	4
Dallas, Texas	3	Toledo, Ohio	2
Eldorado, Ark.	3	Tulsa, Okla.	2
El Paso, Texas	5	Wichita, Kansas	2
Houston, Texas	3	Albuquerque, N. M.	4
Joplin, Mo.	2		



The LUDLOW-SAYLOR WIRE COMPANY St. Louis

Changes in Treating of Light Oils

Old Methods Being Revised To Meet New Requirements. Contact Filtering of Gasoline and Kerosene

By Dr. C. K. Francis
Technical Editor

The purification of the fractions commonly called gasoline, naphtha and kerosene has come to be one of the most important operations in the refinery. It appears that there is an increasing demand for improvement in the quality of these products. This is especially true of gasoline, which is used almost exclusively for motor fuel. The superior gasoline must be free from objectionable odor; it must have a color and transparency at least equal to the purest water; it must not deposit gum nor corrode metallic surfaces; it must show no development of color nor become turbid upon exposure to sunlight; it should have an antiknock value and be suitable for use in a high compression motor. All of these characteristics are frequently involved in the treating process.

The complete purification may become more difficult with increase in weight of the product. Kerosene requires more steps in treating than does gasoline. In the language of the refiner, treating is an operation requiring the use of acid and sweetening indicates that alkaline solutions only are used. It is seldom necessary to both treat and sweeten gasoline, but both operations are employed for purifying kerosene.

Sodium Plumbite Process

The oldest and most widely used process for treating is that in which sulphuric acid and a sodium plumbite solution are used. There are very few gasolines which require acid treatment, but pressure distillate and kerosene are usually treated with acid.

The quantity of acid required for ordinary products is seldom more than 3 pounds to the barrel; a few exceptional oils are treated with as much as 6 pounds. Some operators use 66-degree acid, but 60 to 65-degree acid has been found to be sufficient for the reaction and gives good results without the formation of secondary products which have bad odor, and tend to form colored compounds. The acid treatment is followed by washing with water.

After contact with acid the next set of operations constitute what is known as sweetening. These include washing with an alkaline solution of litharge, sodium plumbite solution, which is commonly known as doctor solution; addition of sulphur; settling and washing with water. It is the process which is ordinarily applied to gasoline and naphtha.

While straightrun kerosenes ordinarily require the addition of sulphur in order to cause the precipitation of the lead and decolorize the oil, this is not always necessary when treating cracked products. It is explained that straightrun kerosenes usually contain too little free sulphur or hydrogen sulphide to complete the reaction with the mercaptide, hence the sulphur must be added to meet the deficiency. The cracked products frequently contain more than enough available sulphur to satisfy the conditions for the reaction, and when this is true, addition of sulphur becomes necessary; acid in fact, does harm by permitting the excess sulphur to go into solution in the product.

The sweetening of gasoline from crudes containing hydrogen sulphide is facilitated because of the sulphur available. In some cases small quantities of powdered sulphur are necessary, but the product from these crudes may be sweetened with much smaller quantities of sulphur than normal.

Action of Doctor

Went and Diggs, also Wood, Lowy and Faragher, have explained the action of the doctor or sodium plumbite solution. The black precipitate formed immediately upon adding doctor solution to the oil, is caused by the presence of hydrogen sulphide. When there is no sulphur compound present, the black precipitate of lead sulphide settles rapidly, leaving the oil perfectly clear and colorless. However, this is a condition seldom encountered. The usual condition is that the precipitate which first forms is a yellow or orange color, which upon standing changes to brown and finally black. Sometimes, there will be a coloring of the oil, but no precipitate until after a small quantity of sulphur is added. This is described by the treater as breaking out

In the absence of hydrogen sulphide or sulphur the sodium plumbite and sulphur compounds present in the petroleum fraction, known as mercaptans combine to form mercaptides.

Ethyl mercaptan — Sodium plumbite

$$2\ C_2H_5SH + Na_2PbO_2 =$$

Lead mercaptide — Caustic soda

$$(C_2H_5S)_2Pb + 2\ NaOH$$

Upon the addition of sulphur the diethyl sulphide and lead sulphide (PbS) are produced.

$$(C_2H_5S)_2\ Pb + S = (C_2H_5S)_2 + Pbs$$

The diethyl sulphide is soluble in the oil but the lead sulphide is precipitated. This sweetening has removed no sulphur but has changed the form of the sulphur and the product reacts sweet to the doctor test.

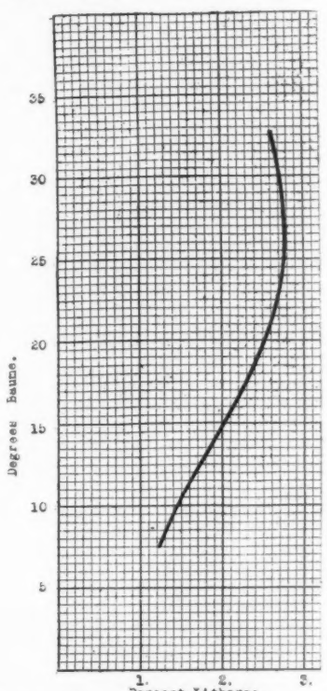
Modern Treating Plant

The modern treating unit usually consists of a series of tight tanks which contain the treating solutions and through which the product is caused to flow. The first contact is made with sulphuric acid. The acid should be held in coils, which are provided with baffle plates or some kind of packing for the purpose of breaking the stream and causing intimate contact of the acid and the oil or distillate. There are also special devices for introducing and mixing the acid which require little space and are very efficient. All flow of the product being treated is upward, because the acid and the treating solutions are all heavier than the oil.

The product flows from the acid treater to a settling tank where any acid that may be carried over settles. The next tank may be a wash tank. Here any traces of acid are removed by washing with water or alkali. It is next passed through the doctor solution, then to a settling tank, and through two tanks containing water, and finally a settling tank. The sulphur is introduced into the doctor tank.

The whole operation is under close observation with frequent tests being made to determine the extent of the action. Laboratory control is important, and the chemist may accompany a product through the treaters by means of hand treats so that solutions are kept at a constant strength or varied when necessary.

The strength of the doctor solution has to be considered from two angles. There must be enough caustic soda present to unite with the sulphur compounds and also hold the litharge in solution. The curve showing the concentration of litharge in caustic soda indicates that litharge is soluble to the extent of 2 per cent in 15 degrees caustic, and only 2.75 per cent in 30-degree solution. The waste from the treaters is always strongly alkaline, so there appears to be little chance of having the solution too weak in alkali, however 2 per cent of litharge is desirable. This corresponds with good practice, for the treater operators prefer a doctor solution of about 15 Baume.



Curve showing solubility of litharge in caustic soda.

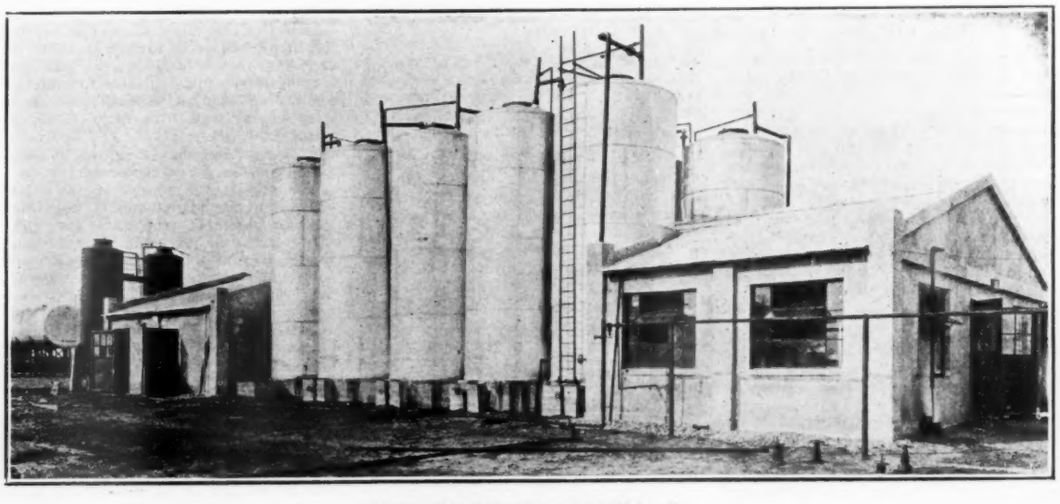
Contact Treating

Very finely ground fuller's earth and special clays are used for the purification of gasoline and kerosene by the method known as contact filtering. Clay has a special value for the treating of gasoline under two conditions. The first where the gasoline does not require a very extensive treatment to bring it to color, and in this case clay alone may be used. In another condition clay alone will not produce the desired results, so that acid is necessary.

In either case the clay may be applied to the gasoline in several ways, which are all quite obvious and readily suggest themselves to the refiner. One is to mix the clay with a sufficient gasoline to produce a cream or mud and feed this cream into the body of gasoline to be treated, either in a mass as in an agitator, or in a flow stream as in a continuous mixer or centrifugal pump. This manner of application is particularly suitable where the use of clay takes the place of a previous acid treatment and where continuous apparatus is available. The clay may be fed into the stream of gasoline at the place where the acid ordinarily enters, and the same tanks or mixers may in most cases be used for keeping clay in contact with the gasoline and allowed time for the reaction to take place. If the gasoline is handled in a batch-agitator the clay may be fed into the gasoline a sack at a time, or better it may be fed in through a continuous feeder or through a small shaking screen. In any case the gasoline should be kept well agitated while the clay is being put in and care should also be taken that the clay is not introduced in masses, as for instance by emptying the entire sack, as this will produce balls of clay wet on the outside and dry inside, which are very difficult to break up. Circulation through centrifugal pumps, by pumping off at the top and in at the bottom, is preferable to air agitation as clay is much lighter than acid and does not require violent agitation to keep it in suspension.

The quantity of clay required may be determined only by experiment. Where a gasoline is very near to color as small a quantity as one-eighth pound of clay to the barrel of gasoline may sometimes bring it to the standard. At the other

(Continued on Page 394)



Modern installation for treating light oils.

Many Future Sources of Motor Fuel

Requirements of Entire World Obtainable if Necessary From Several Sources. Changes in Engine Design Important

By Jacque C. Morrell and Gustav Egloff
Universal Oil Products Company, Research Laboratories, Chicago, Ill.

GASOLINE—PRESENT AND FUTURE

In the accompanying article the authors summarize the present status of motor fuel manufacture with a discussion of the probable future developments. Starting with crude petroleum which at present is the major source of the world's motor fuel supply, the other sources are taken up with a brief explanation of the manufacturing operation necessary to convert raw material into fuels suitable for the operation of internal combustion engines.

Some of the new sources are in the experimental stage while others have been developed on a commercial scale and are already competing with the products of crude petroleum. The discussion includes an explanation of the characteristic of the motor fuels from the standpoint of performance. In this connection it is predicted that certain specifications which work an unnecessary hardship on the manufacturers will be dropped thus adding to the amount of fuel obtainable from the raw material.

Finally the authors discuss some of the new developments in engine design the importance of which from the standpoint of conservation are equal in importance to the potential supplies of raw material.

Petroleum is a complex mixture of hydrocarbons, containing minor proportions of nitrogen, sulphur, and oxygen derivatives of the hydrocarbons. Oil occurs in geological structures made up of sand, sandstones, and porous limestones, generally of sedimentary origin. From the nature of these structures it has been determined that approximately 56 per cent of the area of the United States has the possibility of producing petroleum. The finding of petroleum has been improved since the early days of the industry and at the present time geological methods have displaced the doodle bug and the wiggle stick of the prospector.

The major products from the refining of petroleum are: Gasoline, kerosene, stove or burning distillate, gas oil, fuel oil and lubricating oils, with some less important products such as cleaners' naphtha, turpentine substitute, greases, petrolatum, medicinal salves and oils, etc. Gasoline is the chief product.

In the refining of petroleum, to reduce these products, the crude oil is subjected to a process of evaporation and condensation known as distillation and during this process cuts or fractions are obtained which must meet various tests, such as boiling point range for gasoline, and gravity, flash, fire and viscosity for the heavier or higher boiling products. Gravity is one of the physical properties used for controlling distillation operations.

Cracking Important

One of the great technical improvements made in the manufacture of gasoline from the crude petroleum and the higher boiling petroleum products has been the development of the cracking process.

Cracking as ordinarily accepted is the chemical conversion at elevated temperature (usually under pressure) of the relatively high-boiling hydrocarbons to the relatively low-boiling hydrocarbons suitable for motor fuels. The higher molecular weight hydrocarbons, i. e., those containing a large number of atoms, are broken down or cracked into molecules containing a smaller number of atoms. The reaction is accompanied by the formation of other products, which are not generally recognized in the description of the operation because gasoline is the major product.

Today over one-third of all the gasoline produced in this country is by the cracking process.

Other Motor Fuels

Motor fuels other than gasoline composed of hydrocarbons which have been considered are the alcohols, such as methyl and ethyl alcohol, and "synthol" composed of a mixture of alcohols, ketones, aldehydes and hydrocarbons. Hydrocarbon motor fuels from sources other than petroleum are available from coal tar, shale oil, wood tars and vegetable oils. Aromatic hydrocarbons such as benzol, toluol and xyols are obtained from coal tar. Motor fuel from coal tar, wood tar, shale oil and vegetable oils may be obtained by the cracking reaction.

Alcohols

Methyl and ethyl alcohol are low in calorific value but are adapted for motor fuel use, particularly as a blending agent with gasoline. The sources of ethyl alcohol are: molasses from sugar; starches from potatoes and other vegetables containing starch or sugars; and cellulose which may be hydrolyzed and converted into glucose and the latter fermented into alcohol. The sources of methyl alcohol will be referred to later.

Ricardo's work[1] shows that ethyl alcohol alone, or as a blending agent, has a higher compression ratio than any of the hydrocarbons used for motor fuels. For example, comparing alcohol with toluol and benzol, which are among our best blending agents, the scale would be as follows:

Toluol	100
Benzol	65
25% alcohol in Petrol	130
Upwards of 25% alcohol in Petrol	160

A high compression ratio is essential to increased efficiency of a motor, and knocking must be avoided if it is desired to increase this ratio. Hence alcohol will make a valuable blending agent with hydrocarbons to prevent knocking of the motor.

The total annual production of alcohol in the United States is approximately 50,000,000 gallons, which, if used solely as a fuel, would run the motor cars in this country for approximately a day. Although the raw materials noted are available for the manufacture of alcohol, its future owing primarily to the cost, seems to limit it principally for use as a blending agent.

Benzol

Benzol used alone as a motor fuel is undesirable due to its being a solid at 5 degrees Centigrade and forms excess carbon. In motor fuel mixtures, however, it is an excellent antiknock component. The total production of benzol is less than 2 per cent of the motor fuel consumed in the United States, hence we cannot look towards this as a primary source of motor fuel at the present time.

Future Sources

During the past 20 years the automotive industry in the United States has grown from 100,000 to approximately 22,000,000 vehicles. The following distribution of motor cars and trucks were taken from Commerce Reports, July 11, 1927, where it is stated that 95 per cent of automobiles manufactured are American made:

Country—	No. motor cars and trucks
United States	22,137,000
United Kingdom	1,023,000
France	891,000
Canada	828,000
Germany	323,000

The following tabulation indicates the number of persons per automobile in different countries of the world:

	Persons per auto		Persons per auto
United States	5	Cuba	94
Canada	11	Union So. Africa	99
Hawaii	11	Netherlands	107
New Zealand	12	Spain	138
Australia	17	Germany	196
United Kingdom	43	Italy	294
Denmark	43	Mexico	307
Argentina	45	Brazil	444
France	46	Norway	926
Sweden	61	Dutch E. Indies	1085
Switzerland	76	Japan	1398
Belgium	81	India	3893
Irish Free State	83		

The report of the committee of eleven to the board of directors of the American Petroleum Institute[2] shows an estimate of 31,000,000 automotive engines in the United States by 1930 and approximately 45,000,000 by 1950. The estimated gasoline requirement for 1930 will be 13,249,000,000 gallons of gasoline, while the minimum for that year, based upon more efficient motors, would be 6,662,000,000 gallons. In 1950 it is estimated that 19,133,000,000 gallons will be required, while the minimum requirement with more efficient motors will be one-half this figure.

The question which naturally arises is how are we to meet this vast demand of gasoline. The present day answer takes the form of the processes and suggestions presented below.

Water Power

The development and use of water power and hydroelectric power, and the substitution of these sources of energy for liquid and solid fuels will allow the diversion of the latter to the manufacture of motor fuels suitable for internal combustion engines. The direct use of solar energy will also be a factor in motor fuel conservation. The hydroelectric energy may be stored in batteries as a prime mover of motor cars.

The sun is the source of the latent energy for our planet and is responsible through vegetable growth for our present storehouses of fuel. Indeed, solar energy is also the source of our water power and hydroelectric power through the evaporation of water at low levels and its precipitation in the form of rain and snow at higher levels, thereby permitting the unilization of the energy (gravitational) of the falling water on its course to lower levels.

Estimated Fuel Reserves

The Committee of Eleven in its report to the board of directors of the American Petroleum Institute (loc. cit.) has estimated that 5,000,000,000 bbls. of oil can be obtained from existing wells and proven acreage by available methods of recovery. The oil remaining in this proven acreage, which could be recovered by improved methods, is approximately 26,000,000,000 bbls. At the average present rate of production of 1,000,000,000 bbls. per year of crude oil, allowing for the normal increased production of motor fuel by cracking, these oil reserves would last perhaps 25 years.

This, however, must not be taken as a fixed limit for the total amount of oil which can eventually be recovered in the United States, for we know from past experience that when the demand is urgent, new oil fields are found. The same committee estimates that approximately 56 per cent of the area of the United States is potential oil producing land, and a large portion of this area has been unexplored. In addition foreign fields must be considered such as Venezuela, Colombia, Mexico, Persia and Russia. Furthermore, improved methods of drilling will uncover oil in sands of greater depths. The rejuvenation of the Spindletop Field is an excellent example of this, for in 1924 the production had dropped to less than 1,000 bbls. per day, while at present over 90,000 bbls. per day are being produced.

At the present time the production of cracked gasoline is approximately 33 per cent of the total gasoline production. The average ultimate gasoline yield by skimming and cracking from light and heavy crudes considered together is approximately 75 per cent. Hence, the reserves as now estimated will last even longer than expected if the proper steps are taken to increase the motor fuel yield from crude oil.

From Bituminous Coal

The Committee of Eleven of the American Petroleum Institute has estimated that there are approximately 3,127 billion tons of bituminous coal deposits, including the semi and subbituminous varieties, in the United States. These bituminous coals by low temperature distillation will average 25 gallons of tar per ton of coal, which can be cracked into a yield of approximately 25 per cent of motor fuel of high antiknock properties.[3]

From the known deposits it is estimated that the recovery of motor fuels from this source would supply the world for the next 800 years based on the present rate of consumption and the future use of high compression motors.

Cracking of Shale Oils

The A. P. I. Committee has further reported the presence of 394 billion tons of oil shale in the United States, which can be converted into over 180 billion barrels of shale oil. This shale oil has been cracked[4] into a yield of over 50 per cent of gasoline. It is estimated that the cracking of shale oil into gasoline will supply the world's needs for motor fuel at the present rate of consumption, based upon the operation of high compression motors, for over 150 years.

Wood, Lignite and Peat Tars

Morrell and Egloff[5] have cracked wood tars into high yields of antiknock motor fuels, and the possibilities of cracking lignite and peat tars are at present being investigated, with good promise of high motor fuel yields.

The cracking of wood tars presents an interesting phase of motor fuel production, in that waste wood products may be converted into motor fuels, calling for and permitting a controlled source of supply by regulated reforestation. Sim-

(Continued on Page 400)

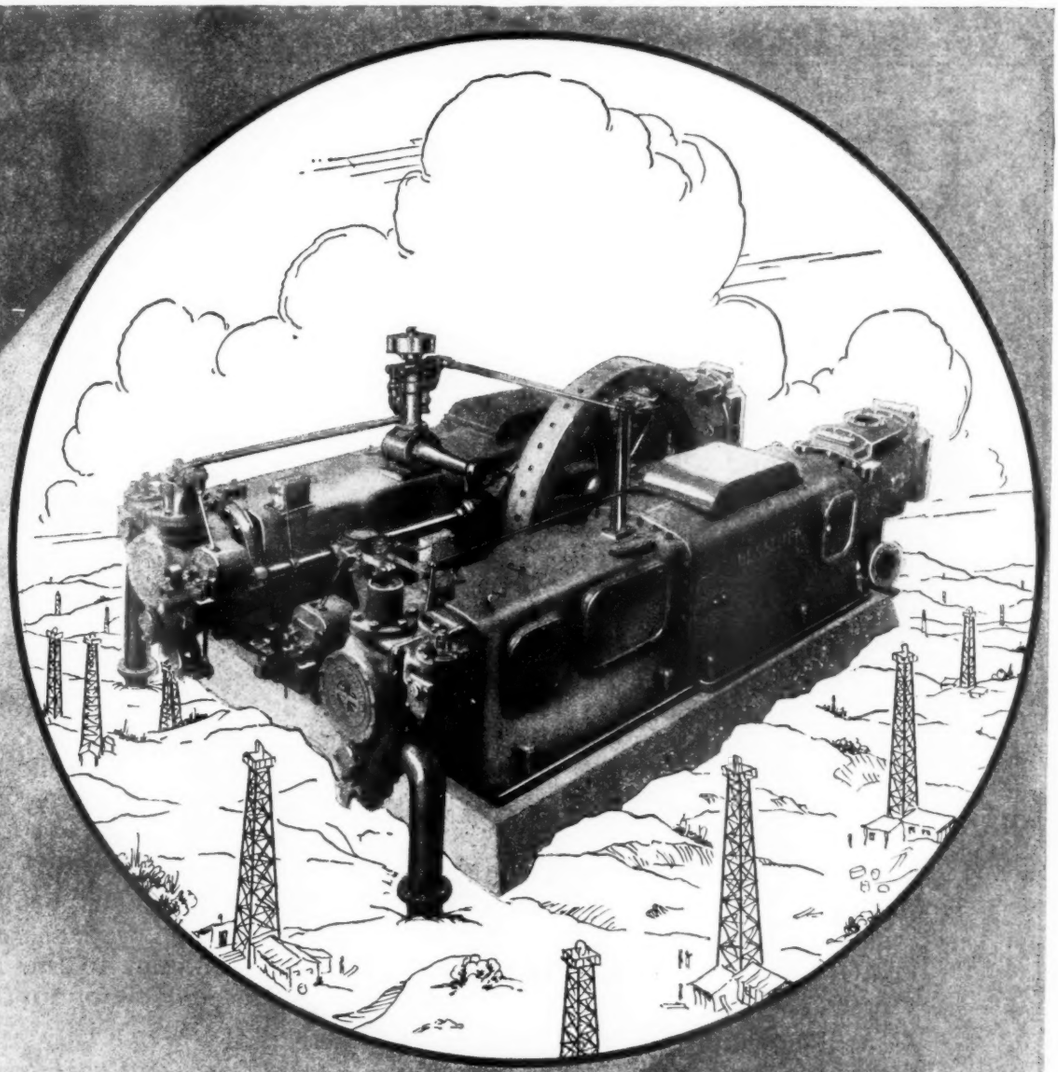
[1] The Internal Combustion Engine, Vol. II, p. 8.

[2] McGraw-Hill Co., New York City, 1925.

[3] Morrell and Egloff, Jour. Ind. and Eng. Chemistry, Volume 17, page 473, 1925.

[4] Morrell and Egloff, Jour. Ind. and Eng. Chemistry, Volume 17, page 801, 1926.

[5] Morrell and Egloff: Abs. Amer. Chem. Soc., Philadelphia, Sept. 6-10, 1926.



Measured by Years Instead of Months

THE true cost of gas compression can be arrived at only by a computation based on *years* of service. With Bessemer compressors this cost becomes materially lower as their length of service increases. Even figured over a period of weeks or months, Bessemers show an outstanding economy due to their high mechanical and compressor efficiency, low operating cost and fractional percentage of unproductive time.

As their length of service increases their economy is even more marked, due to their lower depreciation in service, and continued high average running time with practically negligible maintenance.

For any compressor service, Bessemer compressors—two cycle or four cycle—will show a decidedly lower cost per volume handled, and the longer the time the greater their economy.

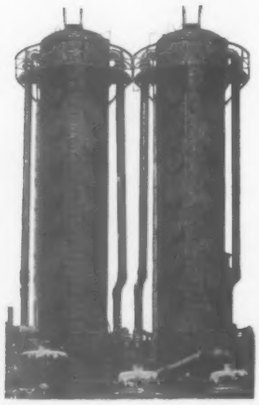
THE BESSEMER GAS ENGINE COMPANY
York Street ∴ ∴ ∴ Grove City, Pa.

BESSEMER

BESSEMER OIL FIELD ENGINES – COMPRESSORS VACUUM PUMPS – ROLLER PUMPING POWERS

BUBBLE TOWERS

Special Fractionating
and
Absorption Equipment



General Refinery
Design and
Construction

We solicit an opportunity to show what our equipment will do in your plant toward increasing yields of the more valuable products as well as reducing operating costs.

We will be pleased to have you inspect any of our numerous installations to see the results attained and how they stand up under hard service.

We will consider it a privilege to be allowed to send an engineer to your plant at our own expense to determine if your recoveries can be increased or your operating costs reduced, what equipment would be necessary to effect these results, and the cost of such equipment.

We believe the fact that over 65% of our business is repeat orders is a better testimonial to the merit of our equipment than anything we might say.

Write for Brochure.

Pipe Stills

The WINKLER-KOCH ENGINEERING CO.

Consulting and Construction Engineers

429 FIRST NATIONAL BANK BLDG.

WICHITA KANSAS

Many Type Tanks for Refineries

Solving the Problem of Reducing Evaporation Losses to a Minimum Necessitates New Equipment

By W. T. Ziegenhain

Refinery tankage is sometimes looked upon as so much room to store oil and little attention is paid to its condition. Refinery profits have been decreased to the point where even strictest economies will not allow a great margin and evaporation losses from inefficient tankage plays a major part in setting the margin of earnings over the year. Refinery losses mean everything the words imply. The refiner has purchased the crude, gone to the expense of refining it and any losses in volume of the products during the processing or in finished storage places a penalty on the operating earnings from which there is absolutely no benefits.

The storage of crude oil is of equal importance to the producer and pipe line company, especially since crude prices are placed on a gravity basis. One degree loss in gravity means a 2-cent lower posted price in the crude and this in turn is justified because the refiner will get approximately 2 per cent less gasoline. If all of the crude could be refined as soon as it is taken from the ground the refinery yield of gasoline would be increased at least 2 per cent more per barrel of crude run. With the average Mid-Continent crude containing 35 per cent gasoline, by natural distillation, it is apparent that between 5 and 6 per cent of the gasoline contained in the crude, is lost before getting to the refinery. This emphasizes the importance of efficient field tankage and what follows with respect to refinery tankage might be applied in part to field tankage as well.

Two Divisions

From an operating standpoint, refinery tankage may be divided into work tanks and storage tanks and then each of these classified for light oil or heavy oil service. Light oil tankage would include the handling and storing of gasoline, naphtha and kerosene while the heavy oil tankage would include all other oils. Work tanks are very small in size compared to storage tanks but so many more are required that the principal refinery investment is in work tanks, especially where lubricants and wax are manufactured.

Because these tanks are small and receive hard use, it is easy to neglect them by minimizing the savings that might accrue from keeping them in good condition at all times. These tanks, especially the gasoline run-down tanks that collect the warm gasoline as it comes from the stills and condensers, can be made to effect great savings. In the average plant, more than 40 per cent of the total crude oil refined is made into gasoline and these tanks handle all of it. Because these tanks have to collect such a large volume of the most volatile and most valuable product at temperatures usually above the atmospheric temperature, there is every chance of building up large evaporation losses here. The amount of these losses is dependent upon the temperature and nature of the gasoline as it is received in the tank and then is dependent upon the tightness and the cooling effect the tank may exert. Refiners have studied these losses and as a result have installed efficient water cooling systems giving the condensers ample capacity even during the hotter summer weather.

When this is done it involves upon the run-down tanks to allow a minimum of evaporation as the tank is slowly filled with the gasoline from the receiving house. These tanks usually hold but a few hundred barrels of gasoline and need to be emptied daily. This size is found best because it allows greater flexibility in operation. Often the still control is not quick enough to stop a still from running over, throwing the gasoline off specifications, or some other factor may make the raw gasoline enough off specifications that it must be handled separately. If large tanks were used, there would be too much gasoline to be reprocessed and the operation of the balance of the plant would be held up. On the other hand, the small tanks do not lead to savings in evaporation losses for as each tank is filled and emptied, a large surface of gasoline is exposed and the evaporation losses are a function of the surface exposed.

Various means of decreasing losses on these run-down tanks are in use and are usually found to be well worthwhile. Government Bureau of Mines tests have shown the average loss of gasoline in run-down tanks amount to 1.8 per cent. This can be cut in half by the adoption of correct equipment and a savings effected considerably above the cost of this equipment.

Vapor-Tight Tank

This may be done in several ways but the most essential general requirement is a vapor-tight tank. In addition, some refiners have hooked their recovery systems into the light oil run-down tanks and this arrangement gives the best results in keeping losses at a minimum but these systems are costly and cannot be economically operated in small units. The principal difference in the various run-down tanks is the roof. Some have wooden roofs covered with tar paper or asbestos paper, others are made of welded or riveted sheets of steel while others are combinations of wood and steel, the wooden portion serving as the support for the thin sheets of galvanized iron or steel. These are vented by various means with care taken to insure safety along with holding losses to a minimum.

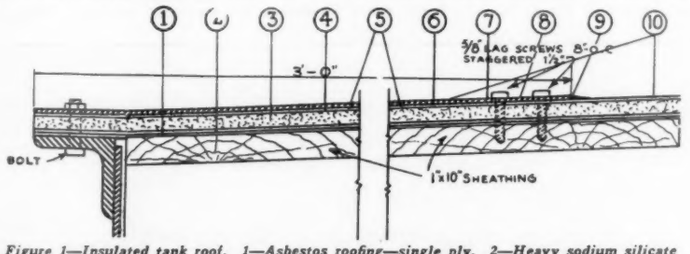


Figure 1—Insulated tank roof. 1—Asbestos roofing—single ply. 2—Heavy sodium silicate mopping. 3—Celotex one-half inch thick. 4—Cement coating. 5—Asbestos roofing—single ply. 6—Cement coating. 7—Asbestos white top—three ply. 8—No. 10 steel plate 3 feet wide. 9—Asbestos fibrated flexible cement. 10—Aluminum paint on plates.

Wooden Roofs

Wooden roofs covered with paper are the cheapest to install and work fairly well on tanks holding oils which do not evaporate readily but in time rot out so the first cost is not the only expenditure on the tank. Tests have shown the evaporation losses in this type of tank to be from 50 to 100 per cent more than a metal covered vapor-tight tank, and although the initial cost is less, this type of roof is not being used in the newer installations. A refinery running 5,000 bbls. of crude oil a day with an average gasoline yield of 50 per cent could well afford to pay the difference in cost to save the .5 to 1.0 per cent gasoline even at today's low gasoline prices. The savings on this basis will be between $11,000 and $22,000 a year.

Several Types

Refiners realize this fact and are adopting vapor-tight tankage as quickly as replacements are made and have adopted several different types of roofs for work tanks or storage tanks. These include the following, each of which has its features: All-steel welded, all-steel riveted, insulated, floating roof, leadclad, water covered and water sprayed, and others.

The all-steel welded roof is simply heavy steel sheeting welded together to cover the entire tank and may be shaped into a cone or an umbrella. This type is usually more costly than the others but takes a low insurance rate and has been found to be very satisfactory in most every instance. This type of roof practically eliminates a chance of shifting, and buckling and the joints are made stronger than the main section. This type lends permanency to the installation.

Riveted steel roofs may be made equally tight and equally efficient at slightly lower costs but as expansion and contraction strains the joints there is a chance for small cracks to break through the calking and in time will materially reduce the effectiveness of the roof. The amount of this cracking is dependent upon the extremes of weather conditions, and the workmanship of the job. This type of tank roof has been very popular on the installations made over the last few years, prior to the extended use of the welded roofs.

Insulated Roofs

There are various types of insulated roofs and each has its features from an operating standpoint but in general the principal advantage over the steel roofs is the matter of price. Practically all of these roofs are laid over a wooden deck and include the use of some heat insulating and noninflammable sheeting to decrease the temperature in the tank and thus decrease evaporation losses. If the insulation material is not vapor tight a covering of galvanized iron is then laid over the top and soldered to make the roof vapor tight. An example of this type of construction may be seen from the accompanying drawing, (Figure 1). This shows the general construction of what is known as the Stough tank roof. First a single-ply covering of asbestos roofing is laid over the wooden deck and mopped with a heavy coat of sodium silicate. Celotex, a noninflammable, vapor-tight material approximately one-half inch thick is then laid over the surface and cemented. Asbestos roofing paper is then laid over this and coated with cement. Three-ply, white-top asbestos paper is then laid over this, completing the covering for the major portion of the tank. To provide a secure base for vents or other equipment, a No. 10 steel bond plate 3 feet wide is laid around the edge of the roof. Other tanks made according to this principle, sometimes cover the insulating material with galvanized iron to protect the surface but when this is done the under portion of the coverings is not made so thick.

Floating Roof

A large manufacturing concern developed a different principle in their floating roof which rises and falls as the liquid level of the tank changes. This allows no vapor space. This type of tank is particularly adaptable as a run-down tank because it will allow a minimum of breathing space as the tank is rapidly filled and emptied almost daily.

Lead Clad Tank

Another type of tank, called the lead clad, is quite different from any of the others in construction. It consists of heavy galvanized sheets riveted and clamped to steel channel irons which form the framework for the roof. These channel irons vary in size from 3 inches for a span of 10 feet to 15 inches for a span of 76 feet, the latter being the longest one in use at present. These channel irons all run in one direction and are spaced 28 inches apart. A lead-coated bracket holding the rivets is set in place and bolted to the channel irons running the entire length of the seam. The lead-coated sheets are then punched and set over the rivet holes and riveted in place.

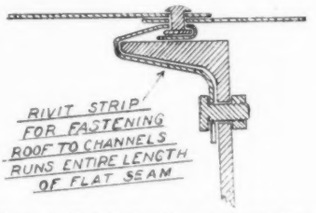


Figure 2—Sketch showing the channel iron support for the lead clad roof.

A diagram of this joint is also shown (Figure 2). It shows the simplicity of construction. After the sheets are in place the joints are soldered vapor tight. The rivet holes are also soldered and the edge of the tank is clamped down and calked. This type of roof will support considerable pressure both from within and from above. Its lead coating prevents corrosion and the roof is finding a wide use in the field on storage tanks.

Water Covered Roofs

Water covered roofs are some times used on smaller tanks but in general are costly because of the heavy supports needed to hold the added weight. The surface evaporation of the water is intended to decrease the temperature within the tank and thus decrease the evaporation losses on the gasoline. Because of the added cost these have not been generally adopted.

Many refiners have sprayed their tanks with water to accomplish the same thing and because of the thinner film of water, the evaporation was faster and where an even spray could be maintained there was an appreciable lowering of the temperature and the evaporation losses were decreased accordingly. Comparable temperatures taken on the same tank of gasoline before and after using the water spray indicates the difference between the liquid temperature and the surface temperature can be cut in half by the spray when the atmospheric temperature is at its maximum.

A representative test on a tank of gasoline showed a liquid temperature of 69 degrees Fahrenheit and a surface temperature of 84 degrees. The weather then became hot and a revolving water spray was placed over the center of the steel umbrella roof and when the temperatures had reached equilibrium the liquid temperature was shown as 86 and the surface was 93. Before the spray was applied the difference between the liquid and surface temperatures was 15 degrees, but after the spray was in operation the difference was reduced to 7 degrees. But there are several objections to using this means of decreasing losses besides the cost of the water. The paint

(Continued on Page 400)

Perfect New Method to Remove Coke

Horizontal and Incline Conveyors Simplify Removal of Product from Dubbs Cracking Units. Minimum of Labor

By H. L. Kauffman

A new type of steel conveyor for the removal of petroleum coke from the expansion chambers of Dubbs cracking units was recently placed in operation at the Parco, Wyo., refinery of the Producers & Refiners Corp. It is said to be the first installation to be made at a refinery.

The installation is handling the coke from four of the new type Dubbs units and two of the old type. The coke output from these units is approximately 75 tons daily. The installation was made by the Jeffrey Manufacturing Co. of Columbus, Ohio.

The method now in use at the Parco refinery consists first in winding a cable around a series of pins on the interior of the chambers after cleaning. The chamber is now closed, the unit placed in operation and the reaction chamber allowed to fill up with coke. To remove the coke, then, after shutting down the battery, the manhead at the bottom of the chamber is opened, and the coke therein is broken up and allowed to fall through the bottom opening by pulling the cable with a hoisting engine.

Horizontal Conveyor

Instead of allowing the coke to fall on the ground beneath the chambers, this coke is now picked up by a horizontal, apron conveyor, 36 inches wide, mounted on heavy-duty, steel thimble roller chain. This steel apron conveyor, with continuous moving ends, is mounted on a structural steel framework, provided with steel skirt plates, which completely seal off from contact with the coke all articulated points and working parts of the conveying equipment.

The horizontal conveyor is located in a concrete pit, 6 feet, 4 inches deep by 13 feet, 6 inches wide. This pit is located central from the reaction chambers from which the coke is discharged.

The conveyor is arranged to receive coke from any one of the six reaction chambers. It carries the coke at the rate of 75 tons per hour, traveling on the apron at a speed of 40-50 feet per minute. The arrangement of the equipment is such that, if desired, one or more of the reaction chambers can be emptied simultaneously.

The coke is conveyed in a horizontal direction to a point passing the last set of reaction chambers, where it is discharged to an incline apron conveyor, made up of the same general design as the horizontal conveyor. The incline conveyor is elevated to a height of approximately 36 feet so that the coke can be discharged into a 100-ton, steel storage bin. This incline conveyor is supported in a structural steel gallery with a walkway on one side, thus permitting ready access to the conveyor for inspection or other purposes.

Steam Drive

The drive for the entire equipment is from a steam engine located on the ground line. Power is applied to the head shaft of the incline conveyor by means of a double-leather belt drive. The drive for the horizontal conveyor underneath the reaction chambers is taken from the foot shaft of the incline conveyor, as a result of which both units are started up in unison.

The entire conveying system is automatic and mechanical. There is no manual labor required other than that necessary for discharging the coke through a 20-inch opening in the floor immediately below the reaction chambers. From that point the coke is carried to the 100-ton storage bin without any attion being given to the conveying system.

The steel thimble roller chain used in this apron conveying system has an 18-inch pitch. It is provided with special Alemite grease fittings. Seamless tube, renewable bushings are furnished for the chain and, consequently, the expense of renewals is confined to bushings for the chain. All working parts of the conveying equipment are carefully shielded and protected from any contact with the coke being handled, thus reducing to a minimum the possibilities of abrasion of such working parts. Thirty horsepower is required for the operation of this apron-conveying system as designed.

The conveying equipment was designed so as not to interfere with the hoisting cable used in loosening the coke in the reaction chambers. For that reason the incline conveyor was set "off-center" a distance of 2 feet, 10 inches. This permits the hoisting rope used in the chambers to pull in a direct line from the hoisting engine.

Former Method

The former system installed at this refinery for handling coke from the expansion chambers consisted of a heavy manganese steel chain running in a cast-iron trough, this drag conveyor discharging the coke into an incline bucket elevator from which, in turn, the coke passed into the one hundred ton storage bin. This endless chain conveying system formerly in use at the Parco plant was fully described in the November 18, 1926, issue of The Oil and Gas Journal. This system was not entirely satisfactory, due to the difficulty experienced in securing a proper discharge from the drag conveyor to the elevator and the further difficulty experienced in securing a proper discharge from the drag conveyor to the elevator and the further difficulty that arose with the elevator, due to the fact that large pieces of coke were not properly picked up by the elevator buckets.

It was because the former installation of drag conveyor and elevator proved to be not entirely satisfactory in operation and relatively high in maintenance cost that, when the question of replacement arose, the present company management decided to install a steel apron type of equipment. Apron conveyors do not agitate or drag the material, dragging being a matter of disadvantage in handling coke from reaction chambers, especially where there is a favorable market for lump coke; but, instead, by the use of an apron-conveying system the coke is carried in a solid, continuous mass.

Storage System

From the one hundred ton storage bin

(Continued on Page 396)

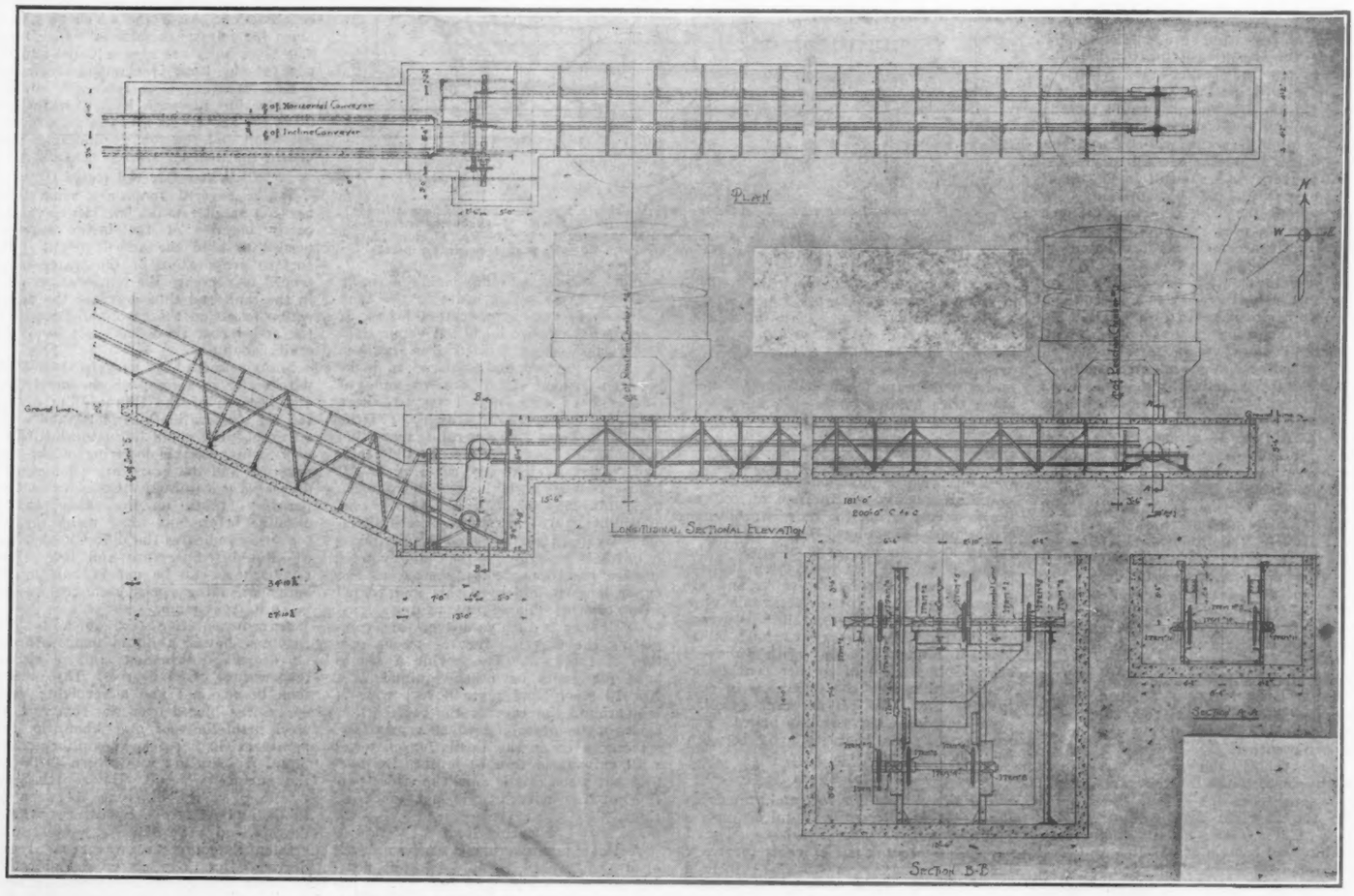
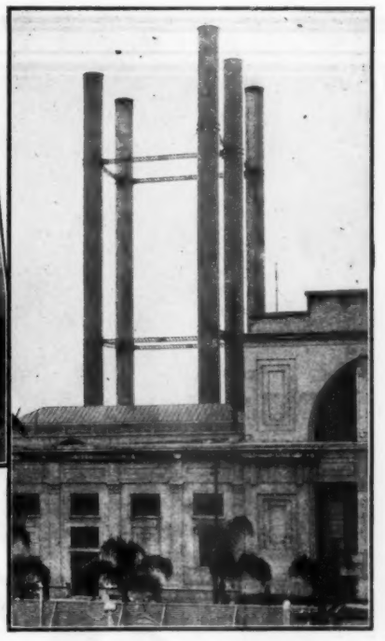


Chart showing general assembly of horizontal coke conveyor.

Right: Smoke stack painted with Bitulumin San Diego Cons. G & E Co.

Lower: Associated Oil Co. Tank Car.



ALUMINUM PAINTS *deflect* HARMFUL SUNRAYS

Bitulumin's Sunray Deflection 86%. Keeps Tanks and Contents Cooler, Minimizing Evaporation.

The rapidly increasing use of Aluminum Paints in general and Bitulumin in particular for protecting a variety of exposed metal surfaces is due to their unusual protective qualities.

Bitulumin successfully resists paint's two worst enemies, sunlight and moisture. It is largely immune to Ultra Violet rays which break down paint surface, allowing moisture to penetrate.

Bitulumin turns away approximately 86% of harmful sunrays, thus keeping tanks and contents cooler and minimizing evaporation.

Bitulumin forms a light resisting durable and moisture proof surface. It will outlast the best lead and zinc paints by two to one.

Bitulumin, while widely used for painting oil storage, is equally efficient on tank cars, metal buildings, refinery equipment, still towers, water tanks, bridges, etc.

Bitulumin, put up in double containers to insure fresh mixing, is manufactured by Hill, Hubbell & Company, manufacturers of a special line of paints for the oil industry.

HILL, HUBBELL & COMPANY

Manufacturers of

Highest Grade Oil Industry Paints and Pipe Line Coatings

Factories at SAN FRANCISCO and TULSA

District Offices

LOS ANGELES HOUSTON SEATTLE

NEW YORK CITY PORTLAND BALTIMORE

NSC

National
are prepared
all Equipment
A.P.I. Specifica
been ad

THE
NATIONAL
COMPA

NSCO

l Stores
d to furnish
nt for which
ications have
adopted

THE
AL SUPPLY
PANIES

New Principle in Contact Filtration

Issue Patent Covering Use of Zinc Chloride with Fine Clays to Polymerize Color-Forming Compounds in Oils

A patent of interest to those refiners and others who are making use of the so-called "contact filtration" method of decolorizing and purifying petroleum products was recently issued to H. L. Kauffman of Denver, Colo., and I. A. Clark of Tulsa, Okla., assignors by mesne assignments to Kauffman, namely, Patent No. 1,636,938. The application was filed on November 11, 1924, Serial No. 749,353, and was renewed on February 25, 1927.

Because in the specifications of this patent there are reviewed, briefly, some of the theories of adsorption that have been advanced by investigators, and since there are also proposed by the inventors some new theories, much of the body of the specifications of this patent will be given in full in succeeding paragraphs.

Patent Claims

The inventors state:

"The coloring matter of petroleum oils, more particularly lubricating oils, is due mainly to the presence of substances of a bituminous or asphaltic nature, as well as to the presence of various complex sulphur and nitrogen compounds. In addition to these substances, color is also very probably due to various colloidal and dissolved impurities, such as finely-divided and colloidal carbon, complex tarry compounds of high molecular weight, etc.

"The removal of substances producing color in a petroleum oil is generally understood to be dependent upon the phenomenon known as adsorption. Adsorption consists in the removal from a solution of a part of the solute when a solid body is introduced therein. Where adsorption is possible, the free layer of the solution possesses a concentration differing from the body of the solution, while at the same time there takes place a change in concentration with a resulting great decrease of the surface tension. Furthermore, if the latter is decreased in the solvent by an increase in the concentration of the dissolved substance, the latter will try to concentrate in the surface layer. By the surface layer is meant every surface that divides the solution from some other substance, either solid, liquid or gaseous. Hence, if a solid body is introduced into a solution, a new surface is created and, if the surface tension of the solution at the surface of contact with the introduced substance is so influenced by the dissolved substance that it becomes smaller with the increase in concentration of the latter, then an increase in concentration of dissolved substances will take place at the surface of contact. If the solution is removed from the solid body, the layer with the high concentration of the solute remains attached to the solid body. In other words, the solid body has adsorbed a portion of the solute and the solution that remains is now less concentrated than it was originally. This is the most generally accepted physical explanation of the adsorption process.

"However, when a decolorizing agent is introduced into a petroleum oil there also takes place certain changes in the oil itself that are of a chemical nature, such as polymerization of tarry, asphaltic and bituminous substances, unsaturated hydrocarbons, etc. The adsorbent, therefore, acts also as a polymerizing agent."

Methods of Decolorizing Oils

Concerning the methods usually used in decolorizing oils it is further stated in the specifications of this patent that:

"The usual method employed in improving the color of petroleum oils, particularly lubricating oils, is to percolate the oil through a column of coarse fullers earth, with or without the aid of pressure, thereby removing part of the cooling matter and solid particles in the oil. Heavy oils are sometimes diluted with gasoline, or other solvent, to facilitate percolation through the clay. A 16-30-mesh clay is usually used on heavy oils, while a 30-60-mesh clay is more efficient on the lighter oils.

"The disadvantages of this process lie mainly in the fact that several days are required for the complete utilization of the clay, and it is impossible to get the entire throughput to a uniform color without blending, since fractions are obtained that vary greatly in color.

"It has long been known in the art that by mixing an oil with decolorizing agent the process of decolorizing and purifying the oil is accomplished in a much shorter period of time than by the process of percolation.

"More efficient results are obtained in this process by the use of finely-divided filtering materials of from 100 to 200-mesh fineness, since, with the same amount of clay, more adsorptive surface is offered to the oil to be treated. The clay and oil are usually mechanically intermixed, heated to the temperature at which the maximum adsorptive capacity of the clay is reached and the spent clay is then separated from the oil by any suitable means, either before or after the mixture has been cooled."

Use of Zinc Chloride

Kauffman and Clark also claim to have found that, in treating certain oils, an even higher efficiency is obtained from the decolorizing material by the addition of certain substances of an organic or inorganic composition, which substances have no practical value under ordinary treating conditions in increasing the efficiency of filtering materials, but which they have found to be of decided value when intermixed with the oil and clay containing sufficient moisture to form a viscous and cohesive mass. By way of illustration, they mention the use of zinc chloride.

Concerning the reasons for the increased efficiency obtained from certain clays when applied to oils in the manner described, the inventors state:

"We are not fully aware of all the reasons for the increased efficiency obtained by treating oils with a filtering material containing sufficient moisture to form a viscous and cohesive mass, but we believe that the steam, generated from the moisture in the filtering material when intermixed with the oil and heated, enormously increases the adsorptive surface of the clay by clearing the microscopic channels of the internal structure of the material of adsorbed gases and water-soluble salts, thereby increasing the clay's efficiency. Also, as the steam generated from the particles of wet clay passes out of the clay particles, the oil diffuses into the microscopic channels of the clay and the maximum adsorptive value of the surface of the clay thus is realized, since the surface has no opportunity to adsorb gases from the air or time to permit the conversion of amorphous silicia into the less adsorptive crystalline form.

"Furthermore, we believe that the commingling of the oil with a filtering material containing moisture increases the surface layer of the oil, due to the surface created between the oil and water, or the steam to which it is converted on heating the mixture, thereby greatly increasing the surface layer of the oil with a resultant decrease of the surface tension, and thus further concentrating the dissolved impurities in the free layer of the oil, rendering a larger percentage of these impurities more susceptible to adsorption. Still further, we believe that steam generated by heating the wet clay, when mixed with the oil, aids in polymerizing the unsaturated asphaltic and bituminous substances in the oil into larger molecular residues, thereby rendering them more susceptible to adsorption by the filtering material.

"Adsorbed substances can not be removed by washing, but can be removed by displacement by other substances and in equal quantities. This, however, is a mass action. It is evident that the impurities of petroleum oils have a greater affinity for the adsorptive surfaces of solid substances than do the individual molecules of water making up steam. However, these impurities once adsorbed can be replaced by hot water or steam when in excess, due to mass action, as shown in recovering spent clay in this manner. It is possible that when these asphaltic and bituminous substances are adsorbed on the surface of a solid particle they are not only polymerized into larger molecular residues, but are also lumped together in large particles which, when displaced by steam, are removable from the oil by subsequent filtration and the solid particles of the filtering material, thus freed of the adsorbed impurities, will again adsorb more impurities from the oil as they come into contact with the oil again during agitation.

Continuous Cycle

"Thus a continuous cycle is established which is limited only by the ultimate decrease of the concentration of the dissolved impurities to a point where the influence of the solid particles of the adsorbent on the concentration of these dissolved impurities in the surface layer of the oil is not sufficient for adsorption to take place. Such a cycle of adsorption, displacement and repeated adsorption could reach this ultimate point of low concentration only under the most ideal conditions, impossible with the complex composition of petroleum oils, but we believe such changes do take place to an extent that greatly increases the decolorization of oils so treated.

"Further, the adsorption of impurities by particles of the clay may also be due to the fact that in acid solutions, i. e., acid-treated oils, asphaltic material is positively charged; while, in contact with water or steam, the adsorbent becomes negatively charged and an asphaltic particle attempting to diffuse into the body of the solid particle of the adsorbent will pass into the capillary opening and may have its positive electrical charge neutralized by the negative charge of the clay and be deposited on it.

"In general, the action of a catalytic agent is not fully understood, but we are of the opinion, however, that when used in our process one or more of the following actions take place: First, that the catalyst (zinc chloride) or catalytic agent in the presence of steam tends to polymerize more rapidly and completely the unsaturated, asphaltic, tarry, bituminious and similar substances into forms of higher molecular residues, thereby rendering these materials more susceptible to adsorption. Secondly, the catalyst (zinc chloride), in the presence of steam, may affect the surface of the adsorbent in such a manner as to increase its influence on the surface tension of the oil, thereby increasing the concentration of the soluble impurities in the surface layer of the oil so that,

(Continued on Page 396)

FILTRATION BY NEW METHOD

The invention explained in this article relates to improvements in the art of decolorizing, clarifying and purifying petroleum oils by the use of untreated or finely-divided clays and similar filtering materials. These materials must contain enough water to form a viscous, cohesive mass sufficiently fluid to be pumped through pipes. After heating the oil to be purified with this decolorant, it is steamed down to a temperature in excess of the temperature of boiling water and the spent decolorant is separated from the purified oil.

The invention also includes the use of zinc chloride in connection with finely-divided clay, the whole being in the form of a clay-pulp, and, as such, applying same to the oil to be purified. Zinc chloride has the property of polymerizing unsaturated and other organic compounds that give color to the oil, and thus, thereafter, the polymerized compounds are more easily adsorbed by the filtering agent.

It is stated in the specifications that the term "clay" as referred to in the patented invention is used in a broad sense to include fuller's earths, diatomaceous earths, clays of the kaolin and related groups, bentonites and other altered volcanic ashes, tuffs, breccias and pyroclasts, and clay minerals such as halloysite, montmorillonite, pyrophyllite, leucite, etc., and other filtering materials of similar characteristics.

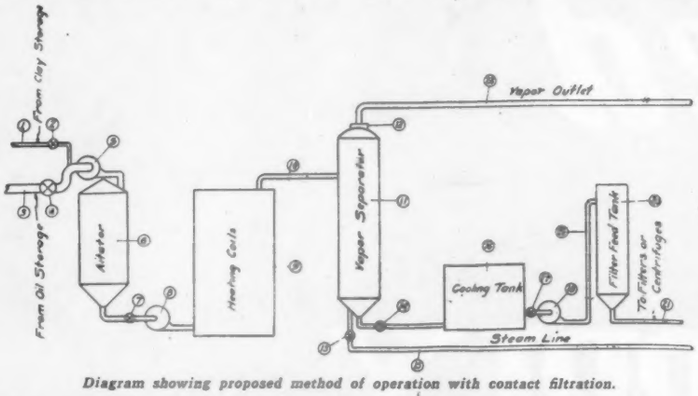


Diagram showing proposed method of operation with contact filtration.

Why Buy Ludlow Valves?

THE GREAT LUDLOW products are manufactured in our own foundry and machine shop by experienced craftsmen who have made the building of Ludlow material their life work. We are pioneers in the Valve and Fire Hydrant industry. From the start, the company has used only the highest grade of raw materials. We make our own castings from our own patterns that are the result of years of effort and study in valve manufacture. WE DO NOT PURCHASE FROM A JOB FOUNDRY.

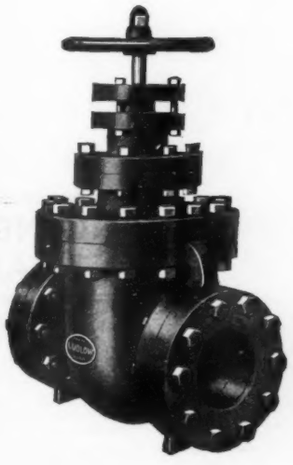
The Ludlow Guarantee

Our guarantee is not given with uncertainty. We guarantee Ludlow products to withstand the working pressures specified and to be free from defects. Our castings are original in design, and undergo careful inspection and separate tests before leaving the factory. Our hydrostatic test is made with the idea that the working pressure does not exceed one-half the test in question; this is not, however, a set operating condition. Ludlow products have a large factor of safety. Our designs, methods of tests, and processes of manufacture are the best known at the present time, and when better valves are made, Ludlow will make them as in the past.

"Worth Its Weight in Gold"

THE LUDLOW VALVE MFG. CO.,
TROY, NEW YORK

KANSAS CITY PITTSBURGH
BOSTON CHICAGO



TRADE LUDLOW MARK

Distributed by

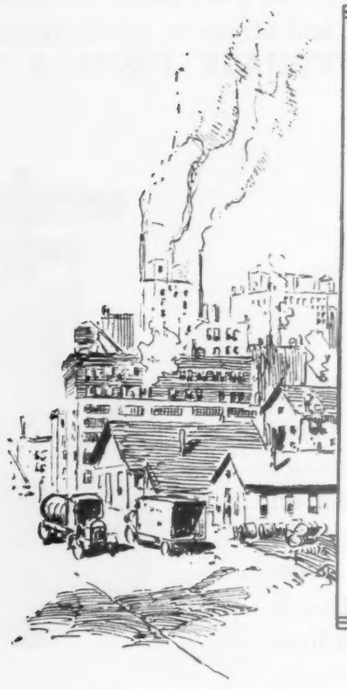
Mid-Continent Supply Company,
Fort Worth, Texas

Harrisburg Pipe & Pipe Bending Co.,
of Texas, Inc., Houston, Texas

Peden Iron & Steel Company,
Shreveport, La.

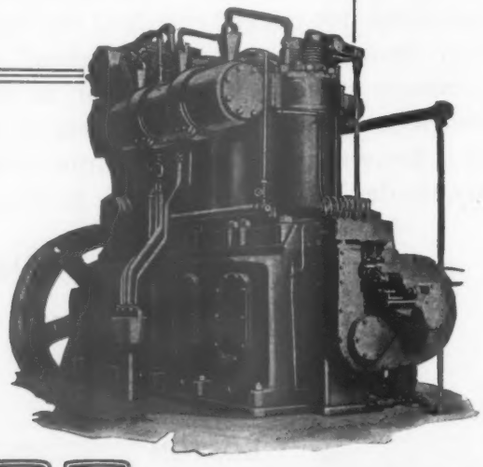
Henderson Iron Works,
Shreveport, Louisiana

HOPE
VERTICAL
COMPRESSORS



The purchaser of a gas compressor pays for a machine, but what he buys is an ability to compress gas. The measure of the economy of his purchase is the total cost per million cubic feet of gas compressed. The Hope Vertical is revealing costs which distinguish it as the most economical gas compressor made. And its economy is not a diminishing quality.

Ask us for specifications



ENGINEERS
CONTRACTORS

HOPE
ENGINEERING AND SUPPLY
COMPANY

DESIGNERS
MANUFACTURERS

MOUNT VERNON, OHIO, U.S.A.
DALLAS, TEX. TULSA, OKLA. CASPER, WYO.

Improvement in Laboratory Apparatus

Constant Changes in Equipment and Methods Necessary in Refining Industry Reflected in Bureau of Standard's Laboratory

By Charles E. Kern
Washington Bureau, The Oil and Gas Journal

The work of the Petroleum Products Laboratory of the Bureau of Standards at Washington may be divided into three general classes.

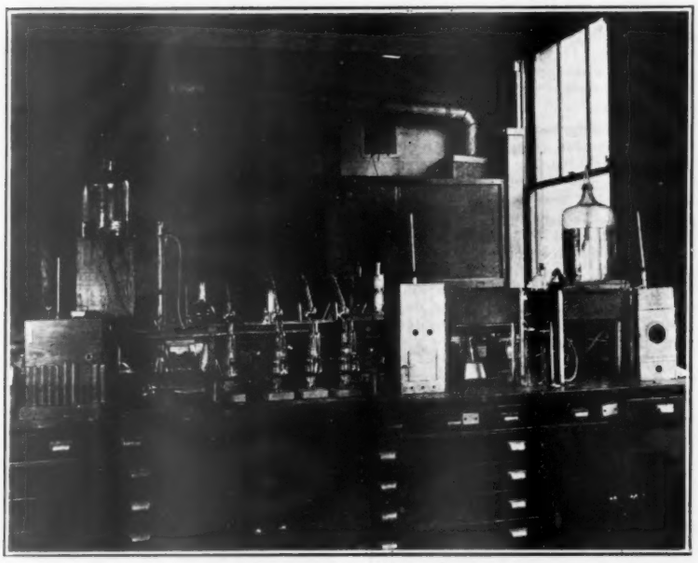
The first class comprises the testing of gasoline, kerosene, fuel oil, lubricating oils and greases. The second class centers around the development of test methods by which these materials may be tested and the third class is concerned primarily in formulating specifications under which these materials may be purchased.

Samples of petroleum products submitted to government departments for purchase are sent to the Bureau of Standards for testing to determine whether they comply with certain specifications. These specifications are prepared by the Federal Specifications Board with the assistance of the Bureau of Standards and other departments of the Government.

Besides testing material purchased by the Government the Petroleum Products Laboratory renders the public a great service in performing referee and standardization testing. Referee testing is done when two or more laboratories have tested the same material and do not agree upon results. The standardization work consists of tests performed for the purpose of standardizing apparatus and pro-

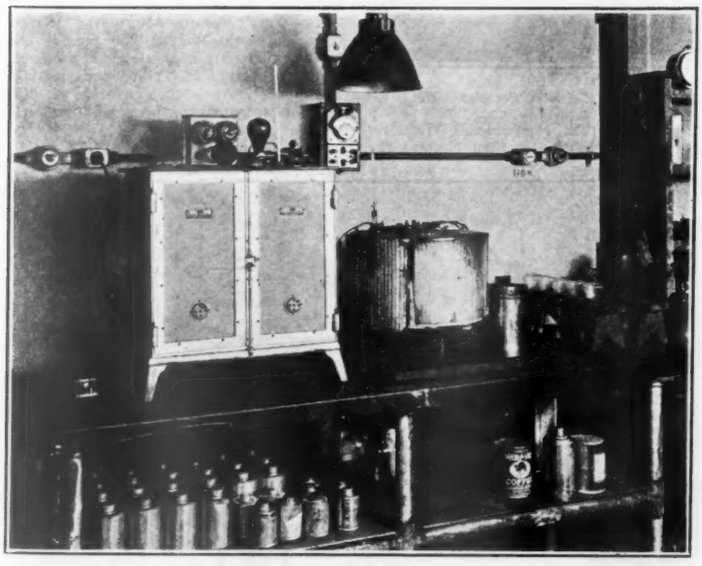
(Continued on Page 398)

GASOLINE TESTING APPARATUS



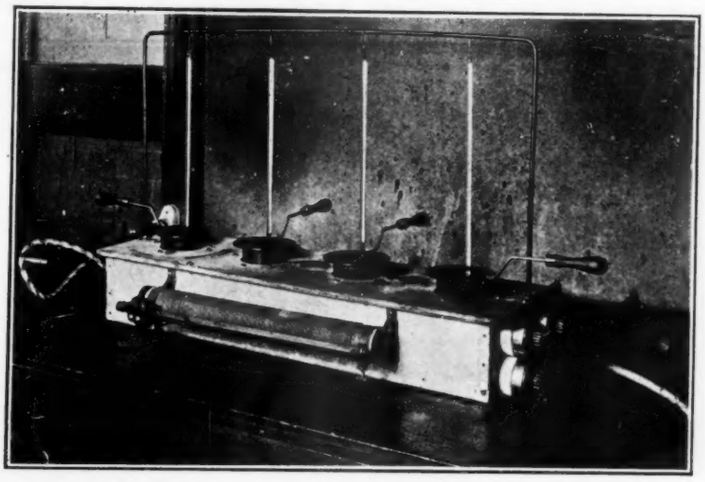
On the left is a bath thermostated 50 degrees Centigrade for making corrosion tests. On the right of the corrosion bath is the apparatus for determining sulphur in gasoline and kerosene. Above the sulphur outfit is an automatic buret by which the solutions used in the sulphur determinations are titrated. On the right side of photograph are two gasoline distillation outfits so arranged as to run two samples at once. This apparatus permits complete tests on eight samples per day.

SLIGH OXIDATION APPARATUS



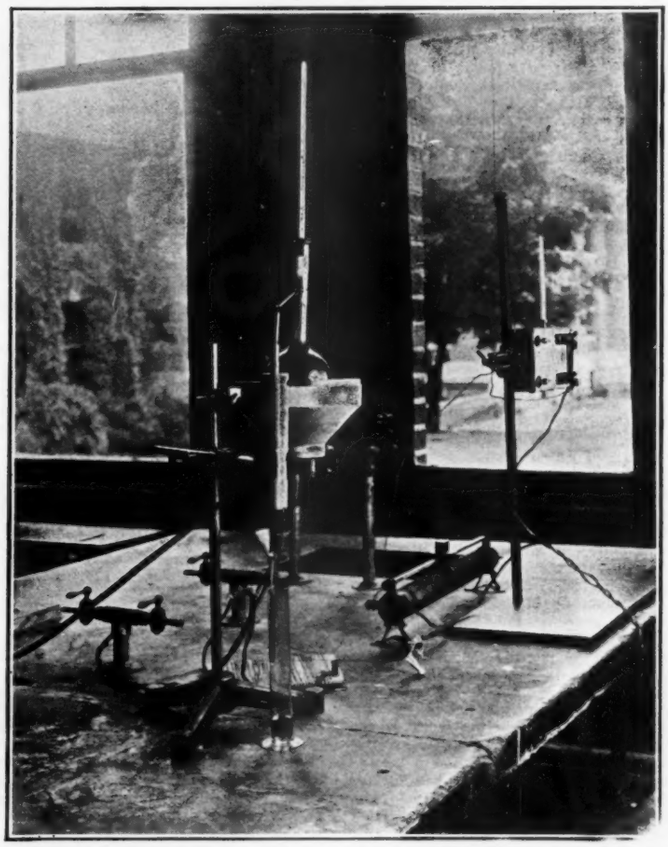
The cylindrical device in the center of the photograph is the Sligh oxidation apparatus which is thermostated to maintain a temperature of 200 degrees Centigrade. The oil is pipeted into the glass flasks shown on the right, the air in the flask is replaced by oxygen and the flask is placed in the oxidation bath for 2½ hours. The extent of oxidation is measured by the amount of material insoluble in petroleum ether. The oven shown at the left of the Sligh oxidation bath is used for drying the precipitates and for general purposes.

MEASURING CRANKCASE DILUTION



Lubricating oils used in automobile engines and other internal combustion engines tend to become diluted with the fuel used. The amount of dilution depends upon engine temperature, leanness of the mixture used and upon frequency of starting and stopping. The instrument shown here is designed to measure the amount of fuel which finds its way into the lubricating oil. At the left side of the picture is a dilution apparatus so arranged as to measure dilution in used crankcase oil either by the capillary funnel method, distillation to a definite temperature, or distillation to a definite specific gravity. At the right of the picture is a greasecometer which is used to investigate the flow characteristics of melted grease.

DETERMINING FLASH POINT OF LUBRICATING OILS



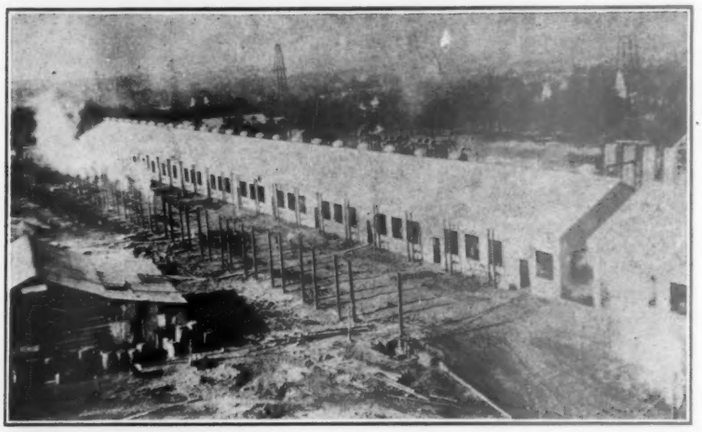
Apparatus to determine flash point of lubricating oils with Cleveland open cup. Four flash points can be determined simultaneously. The contrivance is electrically heated by four 22-ohm resistance coils connected in parallel. The rate of heat is maintained by adjusting rheostat in front of apparatus.

New Methods in Gasoline Manufacture

Thirty-One Natural Gasoline Plants in Seminole Pool of Oklahoma Incorporate Many of the Latest Developments

By C. O. Willson

In a previous article appearing in the September 15 issue of The Oil and Gas Journal, the situation in regard to the gas supply for natural gasoline plants of the Seminole area was discussed. It was explained that when the wells were first completed and flowing naturally the casinghead gas flow was as high as several million feet of gas daily. Later when the natural flow started to drop the crude production was boosted by the application of the air or gas lift. The use of the air lift tends to waste the gas as it generally means that it is not practical to recover the gasoline from the mixture of air and gas. When the gas lift is used it is necessary to recycle large quantities of gas through the plants. Finally, it was explained, that when the air or gas lift ceases to flow the wells it becomes necessary where possible to pump the wells. With the wells on the pump the quantity of casinghead gas is relatively small.



View of the Bowlegs plant of the Sinclair Oil & Gas Co. Building, which is 432 feet long, houses 26 gas engine and compressor units. Six additional units are to be installed.

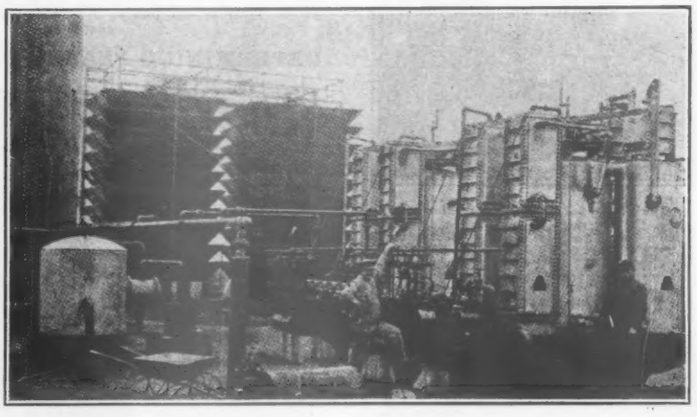
This article is concerned with some of the methods used by the natural gasoline manufacturers to solve the construction and operating problems in the field. As will be apparent later it cannot be said that any standard method of building or operating the plants has been adopted. Practically all the equipment known to the natural gasoline industry has been utilized at one or more plants in the haste to conserve the gas supplies of the field and recover as much gasoline as was feasible under existing conditions. Out of the mixed operations, however, it is certain that much has been learned which will be of benefit to the entire industry should the Seminole conditions be duplicated in later fields.

Sinclair Operations

The natural gasoline department of the Sinclair Oil & Gas Co. is the largest single manufacturer in the field at the present time. Its present production is approximately 170,000 gallons daily and it is expected that this will be increased to around 225,000 gallons before the end of the month. Still further expansion of its facilities are in prospect.

In line with the policy which it has carried out in practically all other fields the company's construction work so far as natural gasoline plants are concerned has been for the most part of a permanent nature. The company has always endeavored to confine its natural gasoline plant operations to fields where it is justified in making a relatively large investment in equipment with the expectation that it will be justified by correspondingly high output over a long period of time. In the Seminole Field the company is a large crude oil producer. The natural gasoline department is taking the gas from the company's own leases and in addition is a large buyer of gas from adjoining leases.

Due to the fact that the company is both a large producer of crude oil and natural gasoline the company's combined operations are of special interest. The two departments are under different managements but due to the wide utilization of the air and gas lift the company has found it expedient to combine certain phases of its operations.



Portable absorption units in operation on lease of the Magnolia Petroleum Co.

The company for several months has been operating three plants in the Seminole Field. Two of these plants are of compression type and one, oil absorption. These plants at present have a combined output of approximately 125,000 gallons daily.

New Plant

The construction and operation features of these three plants are for the most part duplicated with some improvements in the company's fourth and largest plant in the Bowlegs Pool which recently made its first gasoline. The ultimate output of the plant has not yet been decided upon by the management. At the present time it consists of 26 units with 6 more under construction and further additional units will be built if field developments justify.

As the plant now stands it is in several respects, the largest single plant of the natural gasoline industry. Although a permanent installation it has been built in a remarkably short period. The first construction work started on June 16. On August 5, the first compressor unit was started operating. The plant at this time is practically complete including homes and dormitories for the employes, electric lights and gas for fuel, concrete sidewalks, permanent water supply and all other features which are part of a permanent plant.

Although generally considered a combination plant it is in fact two plants, one of which is of the absorption type and the other the compression type. This variance from the usual method of operation can be explained as entirely due to the use of the gas lift in the field.

The plant is located on a Sinclair lease and is surrounded by producing or drilling wells. It was located so as not to interfere with the program of the production department which calls for the drilling of one well for each 10 acres.

Compression Plant

The production department requires the air or gas lift for the operation of these wells and 18 of the compressor units are used for that purpose. The operation of the compressors differs from that used at most of the other installations. In this installation the natural gasoline plant is required to return the gas to the wells at sufficient pressure to operate the wells. The gasoline department buys the gas from the production department on the same basis that it does from other companies. After removing the gasoline it then charges the production department for the service it renders in returning the gas to the leases at a pressure around 300 pounds. This arrangement applies only to the wells owned by the Sinclair company. The units are now operating with gas, although air was used until the gas was available in sufficient quantities.

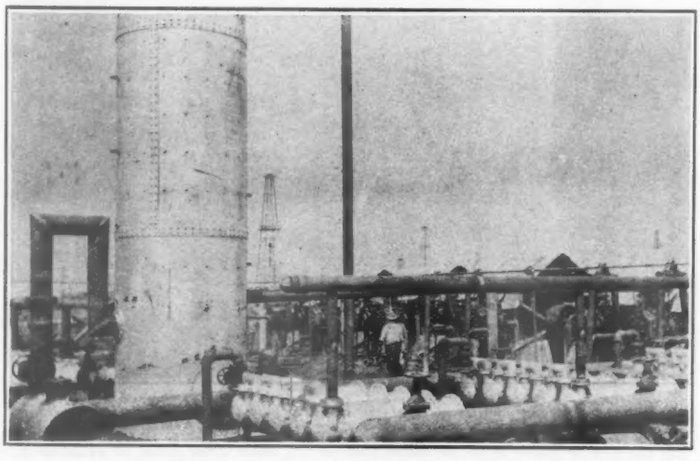
The 18 compressor units (16 by 8 by 20) are divided into three batteries of six units each. Each battery except that they all take suction from the same 20-inch line are so connected that they can be operated separately. The condensing equipment consists of 12 units, 6 of which are for the high stage and 6 for the low. Two each of the high and low stage condensers take care of one battery of six compressors. The compressors are driven by 170-horsepower gas engines.

Method of Operation

In operation the gas from the wells first passes through the low stage of the compressors and then to the low stage condensers where a part of the gasoline is condensed out. The remaining gas then passes to the high stage. The main condensation takes place at a pressure around 300 pounds. These high-pressure condensers are of special design of the shell and tube type. This operation is so manifold that a battery of the compressors or any of the condenser units can be cut out of the system without interfering with the operation. A uniform pressure is automatically maintained on the entire system. From the condensers the residue gas passes through a system of controls and to master meters to another header.

From this header, lines with master meters run to each lease. Each lease has what is termed a "manifold house" from which lines run to each well. These lines each have an individual well control and meters. At the manifold house is a small compressor unit which is used in the operation of the wells. A pressure of 250 to 300 pounds is sufficient to flow the wells under ordinary conditions. However, it is sometimes necessary to have a pressure as high as 1,000 pounds to start the wells flowing after a shutdown or when the operation is first started. In the parlance of the field this is known as the "kick off." This small compressor taking suction from the main line at 250 pounds can be used to obtain the higher pressures when necessary. By the Sinclair method, the operation of the natural gasoline division stops when the gas is delivered to the manifold house.

(Continued on Page 377)



View of absorption plant of the Victor Gasoline Co. in Earlsboro Pool on first day of operation.

An OPEN *Letter to* Motor Truck Users

INDIANA TRUCK CORPORATION
MARION, INDIANA, U.S.A.
J. WILLS STEPHENSON
It has always been our ideal that each Indiana Truck we build should meet in every way the demands placed on it by its owner and its driver. That one thought has been in the minds of our engineers, the men who actually build the trucks and those who sell them.
The advanced design and construction features of Indiana Trucks come as a result of knowledge, not of theory. Our designers have had practical experience in the field, studying the problems of individual operators under the most varied conditions possible. Our experimental department draws on the vast resources of a group of automotive specialists recognized as leaders in the industry. The key men in our plant are master craftsmen with long records of honorable service who take great personal interest in the success of Indiana Trucks.
These things have brought about the inbuilt stamina which enables Indiana Trucks to set outstanding records of performance. We've been building Indiana Trucks for eighteen years - growing steadily in that time. No Indiana Truck will ever be an orphan.
President

INDIANA TRUCK CORPORATION
609 Indiana Park Marion, Indiana

Proved by Performance for 18 Years

INDIANA TRUCKS

4 and 6 Cylinder Models 1 to 7 Ton Capacities

Comparison of Towers in Refining

Baffle, Packed, Sieve Plate and Bubble Types All Have Special Uses in Fractionation of Petroleum Products

By Fred C. Koch
The Winkler-Koch Engineering Co.

IMPROVEMENTS IN FRACTIONATION

Changes in the art of fractionation are one of the outstanding developments in petroleum refining, many improvements being perfected, especially during the past two years. Next to cracking in the distillation process, better fractionation methods account for the increased yield of gasoline from crude oil. In addition, changes in tower design have increased the number of products obtainable on a commercial basis.

There are four general types of fractionating equipment used in the petroleum industry which embrace all columns worthy of special consideration. Each type has its advantages and disadvantages so the selection of a column for any particular duty should be a matter of choosing the one which is most adaptable for a particular use.

In this article the writer describes the four general classes of towers with an explanation of their application in petroleum refining.

The type of column most generally used a few years back was the baffle tower, but it has been rapidly replaced by more efficient types. However, some modifications of this tower have been developed by various concerns which are a big improvement over the old types. For instance, one concern has worked out an improved type of baffle tower wherein a column about 40 feet high, completely insulated and with controlled cooling at the top when rerunning pressure distillate will give a product having the same endpoint as the initial of the bottoms. This is the most efficient column of this type which the writer has observed. Several adaptations of baffle columns used on beer stills have been tried, but with not a great amount of success.

The action of a baffle tower depends on the scrubbing of the vapor with a downflowing sheet of liquid. The efficiency of the column depends on how well the baffles spread the overflowing liquid into thin, evenly distributed sheets. Due to the very large openings for vapor passage, some baffle towers have enormous capacities as compared to other types. This feature, together with the fact that there are no small orifices to become plugged, account for most of its uses. A baffle tower where controlled reflux is used is generally very sensitive, due to the fact that there is seldom a large reservoir of liquid held on the baffles.

The most important applications of baffles towers are (1) contacting vapors or gases with oil which contain suspended solid material, such as lime; (2) on cracking units where the oil in the dephlegmator is high enough in temperature to deposit coke; (3) preheating the feed to pressure stills by contacting it with the hot vapors where perfect separation is not vital; (4) on vacuum lubricating stills where an extremely low pressure drop is essential and perfect separation is not of primary importance; (5) for operation under very high pressures where perfect separation is not important and where the diameter of the tower must be kept small to avoid the high cost of excessively thick shells.

In general, one can say that a baffle tower is a poor contacting device, but for a given cross-sectional area has a very large capacity, will not become plugged, and will operate with a very small pressure drop. Due to the simplicity of their construction, most baffle towers are cheaper to build than other types.

Packed Towers

Packed towers have not found the wide application that their efficiency deserves, due chiefly to lack of knowledge of the proper proportions of the column needed for each particular duty and each particular type of packings, as well as the extreme care which must be used in both the erection and operation of the tower if proper results are obtained. Most packed towers in the industry do not have the proper diameter, proper height, or proper distribution to give good results.

There are many types of manufactured packings in use, the most important of which are spiral tile, Heckenbleickner blocks, and Raschig rings. The first essentials of a good packing material are to have a large amount of free area and surface exposed per cubic foot. The larger the amount of free area the more vapor and liquid the column will handle per square foot of cross-sectional area. The more surface exposed the less the height of packing must be to accomplish the same result.

Most "homemade" packing is crushed granite screened to various sizes, such as 1 inch to 1½ inches, one-half inch to 1 inch, one-fourth inch to one-half inch. The smaller the size of packing used, the lower will be the height of the tower needed to accomplish a certain result, although the greater in diameter it will have to be.

Screened gravel, limestone, etc., should never be used in fractionating columns, as it has a tendency to decompose under heat and will also be attacked by various alkalis and acids. Manufctured packings and crushed granite are superior in this respect, being practically impervious to corrosion or attack by chemicals.

In order to accomplish a certain result with a particular type of packing, it might be necessary to use a 6-foot diameter column with 30 feet of packing. To accomplish the same results, both as regards efficiency and capacity, with a slightly larger packing, it might require a column 5 feet in diameter with 40 feet of packing. Manufactured packings, while practically always superior to other varieties, cost considerably more.

Two Factors

To secure good results from a packed tower, it is essential that two factors be observed:

(1) That the reflux and vapor be evenly distributed over and under the packing.

(2) That the tower be operated at as high a rate as possible.

If the reflux and vapor are not well distributed over the packing, the well-known "channeling" phenomenon will be observed, where the liquid will travel down one portion of the column and the vapor will go up the other without meeting each other. Too much importance can not be placed upon proper distribution of the liquid, and, if the column is very large in diameter, on the distribution of the vapors.

If the vapors enter the base of the column at a very high velocity, they should be turned to the bottom at the middle of the tower, so that they will have an opportunity to equalize their pressure and velocity and begin their ascent through the packing uniformly.

If one will observe the liquid, which is being sprayed in the top of the tower, flowing from the bottom of the packing, he will immediately see what a strong tendency there is for channeling and how difficult it is to obtain perfect distribution.

Various types of distributors and sprays are in use, small nipples projecting at intervals over the cross-section, several kinds of atomizers, pan distributors, and perforated plates. One unique type of distributor is made by having two loosely connected flanges lying horizontally in a closed pipe circuit above the packing. The reflux is pumped with a simplex pump which delivers the liquid in surges, squirting it out at intervals through the sides of the flanges. It is claimed that this surging action gives better distribution than a regular flow.

High Vapor Velocity

It is essential that a high vapor velocity be used for two reasons: (1) A high vapor velocity means that a larger amount of liquid will have to be delivered back over each square foot of packing cross section which greatly improves the chances of securing good distribution of the liquid. (2) The higher velocity of the vapor reduces the thickness of the stagnant vapor film protecting the surface of the liquid resulting in more intimate contact between the liquid and the vapor stream.

A packed column works very poorly at refluxed capacity, since there is less liquid to be refluxed, which adds considerably to the difficulty of obtaining proper distribution.

To secure anything like good action, it is essential that the packing be uniformly wet at all times. Generally speaking the more efficient a packed tower is, the greater is the pressure drop through it. A packed tower is by no means immune from becoming plugged with foreign matter, although the larger the packing the less the likelihood of this happening.

Since most manufactured packings are not very strong for any considerable height of packing, it is necessary to support it at intervals, both to prevent the packing from crushing and to obviate the necessity of making the supports so large. Some designers use distributors to redistribute the reflux under each support.

One good feature about small packing is that it will generally flow so that a manway can be provided immediately above each support. When it becomes necessary to replace or clean the packing, the manway can be removed, permitting the packing to flow down a chute to the ground, thereby materially expediting the cleaning operation. With large packing, this is not the case, so that it must be laboriously hoisted out through a manway.

It is believed that it is not wise to build packed towers of very large diameter, since the difficulty of getting good distribution becomes multiplied. For distillation at low temperatures where steam is used, resulting in water being present in the tower, the packed tower has certain advantages over the bubble tower, which is somewhat handicapped by water tending to settle out on the decks.

The allowable vapor velocity in a packed tower depends on the size and the shape of the packing, the percentage of free space, and the amount of liquid flowing over the packing.

If a packed tower is properly designed and operated it will give as good results as a bubble tower; in fact, some very efficient packings have been developed which are more efficient per foot of height than a bubble tower. However, these packings are so small and expensive that it is impractical to use them on plant equipment.

Packed towers are used to a certain extent on (1) crude batteries; (2) rerun stills; and (3) cracking plants. The cost of a good packed tower is probably as great, if not greater, than the equivalent bubble tower.

Sieve Plate Towers

One type of tower, adopted from the alcohol industry, which has found limited application in refineries and gasoline plants is the sieve plate, usually made by having a deck consisting of a number of small holes in a plate or larger holes with a screen of wire mesh above it. A liquid level is usually carried on the plate by means of overflow pipes as used in a bubble tower. The velocity of the vapors through the small holes is so high that no liquid will flow through them, but it will travel across the plate and down the overflow.

The action of this tower is practically the same as that of a bubble tower, i. e., the contacting of a pool of liquid with innumerable small bubbles, creating thereby a complete froth on the deck.

Since so large a percentage of the cross-sectional area of this type of tower can be used as "slot area" and vapor disengaging space, their capacity is quite large. When operated at the proper capacity their efficiency is in every way comparable to that of a bubble tower. However, they have the somewhat serious fault that they will function only over a comparatively narrow range of capacities since when the vapor velocity gets low the liquid flows down the holes and the liquid seal is lost.

Their most serious fault, however, is the fact that a small amount of foreign material will instantly plug the small vapor openings, thereby rendering the column inoperative. This almost precludes the possibility of introducing the charge in the tower or of using open reflux unless elaborate precautions are taken to see that all foreign material is strained out.

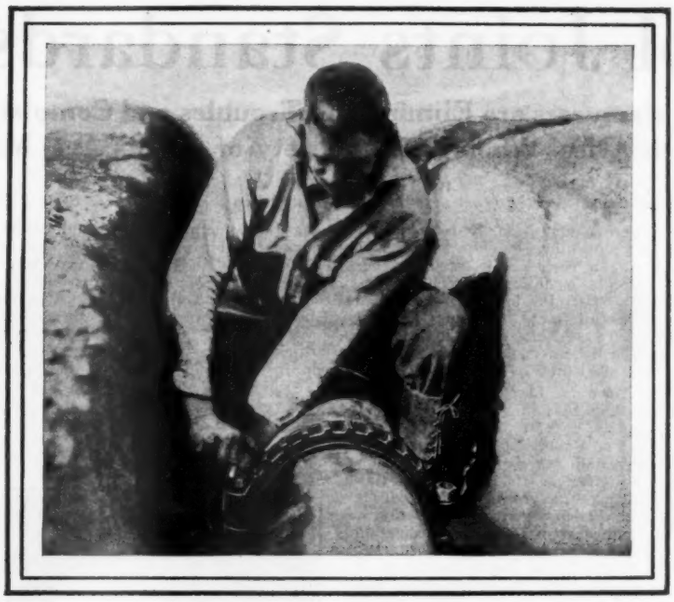
This unfortunate characteristic will perhaps limit the use of this type of column to natural gasoline absorbers and stills and to other isolated cases where the amount of foreign material in the oil is small. For any particular duty, a sieve plate tower can be built at a comparatively low cost.

Bubble Towers

The type of fractionating column which does the major portion of the work in petroleum distillation is undoubtedly the bubble tower. It has attained this position by virtue of its high efficiency, good capacity, and ability to operate for long periods before becoming plugged, and exceedingly wide range of operating capacities.

The capacity of a bubble tower for vapor under any particular condition of operation is dependent on the diameter of the column, the type and size of caps and slots, the spacing and number of the caps and the distance between decks. The efficiency of a tower is dependent on the number of decks, how well the vapor and liquid are mixed, how much entrainment

(Continued on Page 377)



VICTAULIC COUPLINGS *for* OIL and GAS

Many leading companies that produce, refine and distribute oil and gas are large users of Victaulic Couplings. The list includes such companies as Standard Oil Company (N.J.), International Petroleum Co., Ltd., Standard Oil Company of La., Consolidated Gas Company of New York, Texas Pipe Line Co., Standard Oil Co. of N. Y., Roxana Petroleum Corp., Westchester Lighting Co., Springfield Gas Light Co., Skelly Oil Co., Sinclair Oil & Gas Co., Gulf Production Co.,—to mention but a few.

Victaulic Couplings have earned preference because they can be installed faster than any other coupling and by unskilled labor—a joint in two minutes on large size pipe. Pipes do not have to be in perfect alignment for making up a joint. Couplings can be installed easily in the dark or under water. They are time, labor and money savers.

Victaulic Couplings make expansion joints or expansion bends unnecessary because every Victaulic Coupling is a *straight line coupling*, a *flexible coupling* and an *expansion joint*. Victaulic couplings take care of flexure and contraction and expansion of the line without injury to the couplings. Victaulic Couplings withstand vibration or earth movement without leaking.

Victaulic Couplings are supplied for all pressures from vacuum to ten tons pressure per square inch, for all pipe sizes in steel, wrought iron or cast iron from ¾″ diameter up.

For detailed information on uses and users, write for Victaulic Bulletin No. 1

The all-purpose pipe coupling

VICTAULIC COMPANY OF AMERICA
26 Broadway **New York, N. Y.**

Western Distributors

SMITH SEPARATOR COMPANY
Tulsa Okla.

"For every joint on the line"

Flexible, Leak-proof Pipe Couplings

FOR CRUDE OIL, GAS, WATER, SEWAGE, COMPRESSED AIR, ETC.

Cable Tool Joints Standards Finished

Manufacturers are Eliminating Troubles and Complaints Which Arise When Great Variety of Joints Are Made

By Thomas Fleming, Jr.
National Chairman Special Committee of the American Petroleum Institute on Standardization of Cable Drilling Tool Joints

One of the first items considered by the American Petroleum Institute, for Standardization, was Cable Tool Joints. The I. & H. Joint had been recognized by the oil fraternity for some time as the leading joint and most operators had been specifying I. & H. joints when ordering new tools but there was such a wide variation amongst shops in the templets used to turn these joints, that there was no guarantee of interchangeability unless all joints were made by one manufacturer. This was probably due to the influence of the methods used in the development of Cable Tool Joints. There was very little engineering or scientific knowledge used in the early days of the oil industry. The practical man was supreme. Cable Tool Joints were developed by the oil country shops, often, to meet the whims or ideas of a local operator. Very often new joints were made up by reference to oil joints without gauges, established tolerances, or other modern machine shop methods. It, therefore, can be easily understood that even when the I. & H. joint came into general use there were many made by reference to old joints or other loose practices, and there was a considerable variation between joints made by different manufacturers. Certain localities continued to use special joints, particularly in oil fields where the joint of some local manufacturer had been adopted. In California the H. & T. joint was most widely used.

THOMAS FLEMING, JR.

The American Petroleum Institute in 1922 authorized Louis C. Sands, one of its directors, to call together all manufacturers of Cable Tool Joints in order to determine whether standardization could be effected. In response to this call, 15 manufacturers of Cable Tool Joints assembled in Pittsburgh in June, 1922, and agreed that standardization should be attempted. They decided that the I. & H. Joints should be the basis of standardization. A subcommittee was appointed to put this into effect and to report back to the committee.

Subcommittee's Study

This subcommittee made a very thorough study of the problem. It was important that the standards set up should conform with standard practice in thread construction and at the same time preserve a certain amount of interchangeability with existing joints in use. It was found that the thread of the I. & H. Joints very closely approached the U. S. Standard 7 thread flat head and that an A. P. I. joint could be developed along these lines which would closely approach the I. & H. Joint and would to a great extent be interchangeable with existing I. & H. Joints. Eleven sizes of joints were agreed upon as essential and the committee also established dimensional standards for the wrench squares and box and pin collars.

This committee also developed a procedure for the control of the issuance of licenses by the Institute, authorizing the manufacture of joints and proper marking of same.

On October 20, 1924, these standards were adopted by the Institute, and the Standardization Committee was continued in order to develop the gauges and promote the use of the standards. One of the largest gauge manufacturers in the United States was employed to undertake the manufacture of the master gauges and reference gauges. All manufacturers of cable tools placed orders for the necessary master gauges with this gauge manufacturer and several experts on gauges were assigned to the task of creating a set of standard gauges which would be basically sound and would give the proper control for interchangeable joints. It was also thought advisable to develop gauge tables which would be sufficiently complete in specifications to permit rebuilding gauges in the future in case all reference gauges should be destroyed. Proper tolerances were also established by the committee.

Work Naturally Slow

The work of this committee was naturally slow as nothing had been attempted before in developing master gauges for joints of this type and considerable research work had to be done by the gauge manufacturer. It is interesting to know that practically every manufacturer of Cable Tool Joints and many of the large companies with field shops entered orders for master gauges. The total number of gauges ordered was 630 for 48 licensees. This large number was of considerable advantage to the gauge manufacturers in perfecting the reference master gauges. The most perfect gauges were selected for the reference master gauges and four sets of these were sent to the United States Bureau of Standards at Washington for calibration and certification. The most perfect set was retained by the United States Bureau of Standards and the other three sets were deposited with custodians located at Pittsburgh, Pa., Bartlesville, Okla., and Los Angeles, Calif. Arrangements were made by the committee for the custodians to check up master gauges and issue reports on the comparison of these master gauges with the manufacturers' gauges, for a nominal sum. All users of master gauges are required to check up not less than once a year with the nearest custodian.

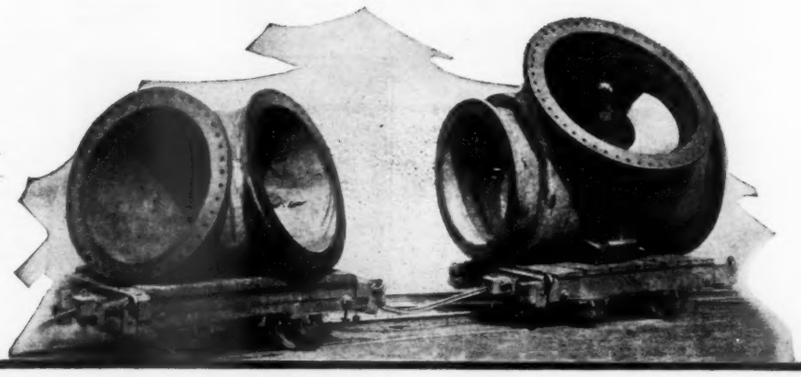
D. S. FAULKNER
National Vice Chairman

C. T. MAPES
National Secretary

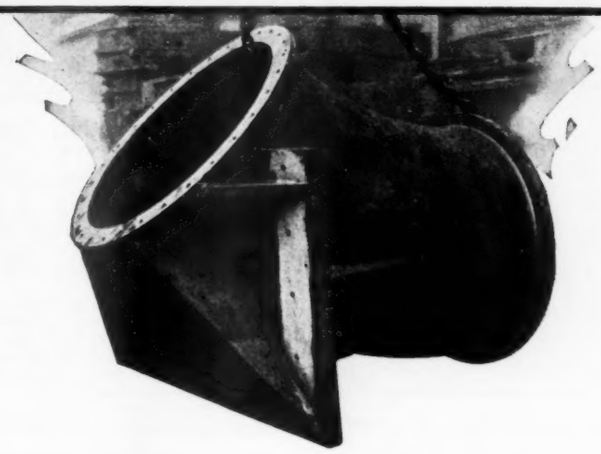
The gauge manufacturers completed delivery of all master gauges during the summer of 1926 and at that time A. P. I. Cable Tool Joints were made available to the operator. A canvass of cable tool manufacturers indicates that most of the manufacturers have standardized on A. P. I. joints and that they are in gen-

306 cable tool joint gauges used by one manufacturer of cable tools before standardization and now replaced by 11 A.P.I. gauges.

Cable tools with A.P.I. joints assembled for shipment at warehouse of Oil Well Supply Co., Pittsburgh, Pa.

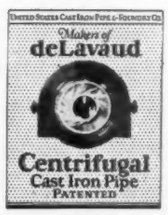


Large standard fittings and special castings



In our various plants we have unusual facilities for handling the largest standard fittings and for making especially heavy castings.

WHILE standard connections should be adopted as far as possible, it sometimes happens that an exception has to be made to meet unusual conditions. When such conditions arise communicate with our nearest sales office. Our equipment is so complete that oftentimes the castings can be designed to fit equipment already available at one of our plants. This saves the cost and lessens delivery time.



United States Cast Iron Pipe and Foundry Company

SALES OFFICES

Philadelphia: 1421 Chestnut St.
Chicago: 122 So. Michigan Blvd.
Birmingham: 1st Ave. & 20th St.
Buffalo: 957 East Ferry Street
Cleveland: 1150 East 26th Street
New York: 71 Broadway
San Francisco: 3rd & Market Sts.
Pittsburgh: 6th & Smithfield Sts.
Dallas: Akard & Commerce Sts.
Kansas City: 13th & Locust Sts.
Minneapolis: 6th St. & Hennepin Ave.

General Offices:
Burlington, New Jersey

Cable Tool Joints Standards Finished

Manufacturers are Eliminating Troubles and Complaints Which Arise When Great Variety of Joints Are Made

By Thomas Fleming, Jr.
National Chairman Special Committee of the American Petroleum Institute on Standardization of Cable Drilling Tool Joints

One of the first items considered by the American Petroleum Institute, for Standardization, was Cable Tool Joints. The I. & H. Joint had been recognized by the oil fraternity for some time as the leading joint and most operators had been specifying I. & H. joints when ordering new tools but there was such a wide variation amongst shops in the templets used to turn these joints, that there was no guarantee of interchangeability unless all joints were made by one manufacturer. This was probably due to the influence of the methods used in the development of Cable Tool Joints. There was very little engineering or scientific knowledge used in the early days of the oil industry. The practical man was supreme. Cable Tool Joints were developed by the oil country shops, often, to meet the whims or ideas of a local operator. Very often new joints were made up by reference to oil joints without gauges, established tolerances, or other modern machine shop methods. It, therefore, can be easily understood that even when the I. & H. joint came into general use there were many made by reference to old joints or other loose practices, and there was a considerable variation between joints made by different manufacturers. Certain localities continued to use special joints, particularly in oil fields where the joint of some local manufacturer had been adopted. In California the H. & T. joint was most widely used.

THOMAS FLEMING, JR.

The American Petroleum Institute in 1922 authorized Louis C. Sands, one of its directors, to call together all manufacturers of Cable Tool Joints in order to determine whether standardization could be effected. In response to this call, 15 manufacturers of Cable Tool Joints assembled in Pittsburgh in June, 1922, and agreed that standardization should be attempted. They decided that the I. & H. Joints should be the basis of standardization. A subcommittee was appointed to put this into effect and to report back to the committee.

Subcommittee's Study

This subcommittee made a very thorough study of the problem. It was important that the standards set up should conform with standard practice in thread construction and at the same time preserve a certain amount of interchangeability with existing joints in use. It was found that the thread of the I. & H. Joints very closely approached the U. S. Standard 7 thread flat head and that an A. P. I. joint could be developed along these lines which would closely approach the I. & H. Joint and would to a great extent be interchangeable with existing I. & H. Joints. Eleven sizes of joints were agreed upon as essential and the committee also established dimensional standards for the wrench squares and box and pin collars.

This committee also developed a procedure for the control of the issuance of licenses by the Institute, authorizing the manufacture of joints and proper marking of same.

On October 20, 1924, these standards were adopted by the Institute, and the Standardization Committee was continued in order to develop the gauges and promote the use of the standards. One of the largest gauge manufacturers in the United States was employed to undertake the manufacture of the master gauges and reference gauges. All manufacturers of cable tools placed orders for the necessary master gauges with this gauge manufacturer and several experts on gauges were assigned to the task of creating a set of standard gauges which would be basically sound and would give the proper control for interchangeable joints. It was also thought advisable to develop gauge tables which would be sufficiently complete in specifications to permit rebuilding gauges in the future in case all reference gauges should be destroyed. Proper tolerances were also established by the committee.

Work Naturally Slow

The work of this committee was naturally slow as nothing had been attempted before in developing master gauges for joints of this type and considerable research work had to be done by the gauge manufacturer. It is interesting to know that practically every manufacturer of Cable Tool Joints and many of the large companies with field shops entered orders for master gauges. The total number of gauges ordered was 630 for 48 licensees. This large number was of considerable advantage to the gauge manufacturers in perfecting the reference master gauges. The most perfect gauges were selected for the reference master gauges and four sets of these were sent to the United States Bureau of Standards at Washington for calibration and certification. The most perfect set was retained by the United States Bureau of Standards and the other three sets were deposited with custodians located at Pittsburgh, Pa., Bartlesville, Okla., and Los Angeles, Calif. Arrangements were made by the committee for the custodians to check up master gauges and issue reports on the comparison of these master gauges with the manufacturers' gauges, for a nominal sum. All users of master gauges are required to check up not less than once a year with the nearest custodian.

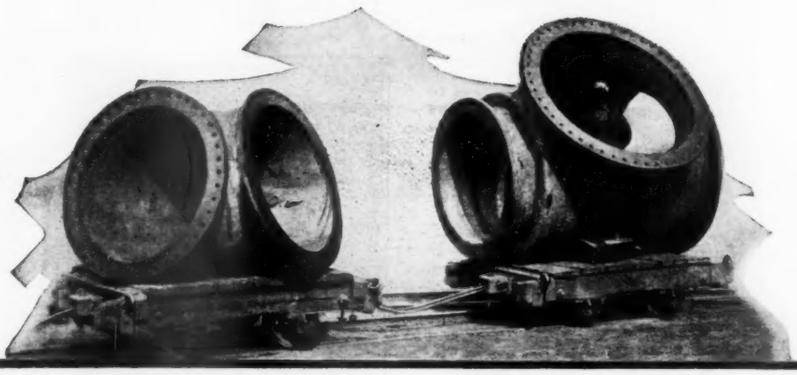
D. S. FAULKNER
National Vice Chairman

C. T. MAPES
National Secretary

The gauge manufacturers completed delivery of all master gauges during the summer of 1926 and at that time A. P. I. Cable Tool Joints were made available to the operator. A canvass of cable tool manufacturers indicates that most of the manufacturers have standardized on A. P. I. joints and that they are in gen-

306 cable tool joint gauges used by one manufacturer of cable tools before standardization and now replaced by 11 A.P.I. gauges.

Cable tools with A.P.I. joints assembled for shipment at warehouse of Oil Well Supply Co., Pittsburgh, Pa.



Large standard fittings and special castings

In our various plants we have unusual facilities for handling the largest standard fittings and for making especially heavy castings.

WHILE standard connections should be adopted as far as possible, it sometimes happens that an exception has to be made to meet unusual conditions. When such conditions arise communicate with our nearest sales office. Our equipment is so complete that oftentimes the castings can be designed to fit equipment already available at one of our plants. This saves the cost and lessens delivery time.

United States Cast Iron Pipe and Foundry Company

General Offices:
Burlington, New Jersey

SALES OFFICES

Philadelphia: 1421 Chestnut St.
Chicago: 122 So. Michigan Blvd.
Birmingham: 1st Ave. & 20th St.
Buffalo: 957 East Ferry Street
Cleveland: 1150 East 26th Street
New York: 71 Broadway
San Francisco: 3rd & Market Sts.
Pittsburgh: 6th & Smithfield Sts.
Dallas: Akard & Commerce Sts.
Kansas City: 13th & Locust Sts.
Minneapolis: 6th St. & Hennepin Ave.

eral use. One large manufacturer reports that during the current year practically all the output has been A. P. I. joints. This same manufacturer previous to standardization received orders for a great variety of joints although the bulk of the production was I. & H. standard.

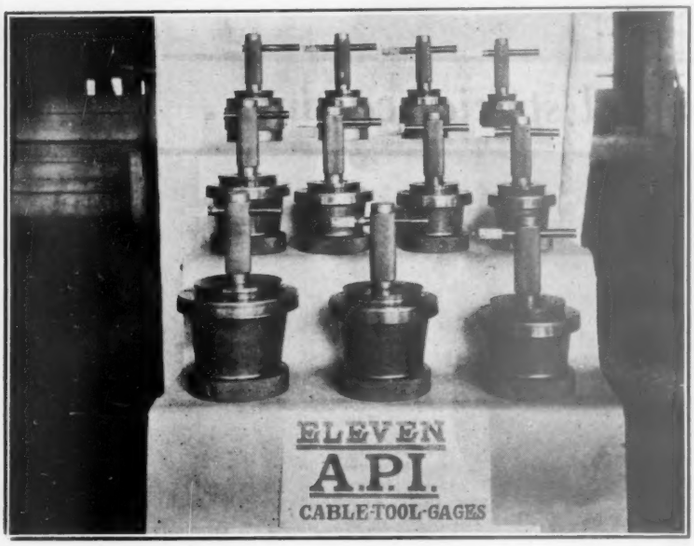
Several of the large producing companies have authorized the changing over to A. P. I. Standard of all joints on old strings and fishing tools. One of the largest companies in California has announced it proposes to change over all the H. & T. joints on its tools to A. P. I. Standard.

Changing to Standard

Standardization of cable tool joints is now an accomplished fact. It will take some time to work over or displace the various types of joints in the field on old strings of tools but the benefits of standardization are being felt already by the manufacturer and the large operator. The manufacturer is eliminating the troubles and complaints which naturally arise when a great variety of joints are being made. The operator can now with safety purchase his requirements from any manufacturer and know the joints will interchange.

The Standardization Committee on Cable Tool Joints is now making an investigation of field conditions in connection with the use of cable tools. A code of recommended field practice will be prepared to assist drillers and operators in the proper care and handling of cable tools. The committee will also continue to promote the adoption and use of the A. P. I. specifications, and to act on all questions that may arise as to interpretation or modification of the adopted specifications.

In conclusion, it is the writer's opinion that standardization of cable tool joints has been brought to a successful conclusion due to the thorough co-operation of the operators and manufacturers and to the deliberate and thorough way in which the project has been handled.



Eleven A.P.I. cable tool gauges furnished each manufacturer to control the 11 standard sizes adopted.

A.P.I. SPECIFICATIONS FOR CABLE DRILLING TOOL JOINTS

These specifications were prepared by the Special A.P.I. Committee on the standardization of cable drilling tool joints. They are based on the I. & H. (Ireland and Hughes) standards that have been in common use in the oil country for the past 25 years and generally known as "Eastern Specifications." While the majority of manufacturers had their own master gauges, there were no national master gauges available for general checking purposes except the original set of soft I. & H. gauges owned by the Oil Well Supply Co., Pittsburgh, Pa.

The committee, after deciding on the standard sizes specified herein, requested the Pratt & Whitney Co. to make up a hardened and ground master gauge in the 3¾-inch size, accurately manufactured to close tolerances. A special subcommittee visited the plants of the principal cable tool manufacturers and compared their master gauges with this specially-made sample gauge. A considerable variation was found between the gauges of the various manufacturers and this sample gauge. It was therefore decided by the committee to establish uniform master gauges for all sizes of joints.

A large group order was assembled among the principal manufacturers and consumers, which was placed with Pratt & Whitney with the understanding that the gauge in each size found to be nearest to the theoretically perfect should be selected as the grand master and become the property of the American Petroleum Institute; these grand masters to be deposited with the Bureau of Standards in Washington, to be used only in case of dispute. Three additional sets of gauges to be selected as being the nearest to the grand masters; to be known as special reference master gauges to be owned by the American Petroleum Institute and deposited with custodians in the Eastern, Mid-Continent and Pacific Coast districts, so that the manufacturers and consumers in these districts could check their gauges at suitable intervals and maintain them up to standard.

These grand master and special reference master gauges have been selected and approved by the Bureau of Standards at Washington, and have been deposited with the Bureau of Standards and the various custodians, as follows:

Grand Masters—Nos. 1 to 11 inclusive, Bureau of Standards, Washington, D. C.

Eastern District Custodian—Nos. 12 to 22 inclusive, Pittsburgh Testing Laboratory, Pittsburgh, Pa.

Mid-Continent District Custodian—Nos. 23 to 33 inclusive, Bureau of Mines, Petroleum Experiment Station, Bartlesville, Okla.

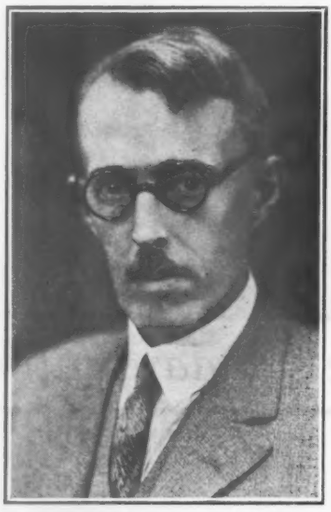
Pacific Coast District Custodian—Nos. 34 to 44 inclusive, Smith-Emery Co., 245 South Los Angeles Street, Los Angeles, Calif.

This group order has been completed, and the A.P.I. grand master and special reference master gauges selected and deposited as noted above, and are now available for general use. This should insure the universal adoption of these standards in the oil country. This specification represents the expenditure of considerable time and labor on the part of the membership of this committee, and is the result of whole-hearted and disinterested co-operation on the part of everyone connected with the work.

Section 1—Material Covered

1-a These specifications are dimensional only, and apply to new material.

1-b. Cable drilling tool joints manufactured in accordance with these specifications are standard. (See Table 1 for size dimensions.)



CHARLES R. PHILLIPS
Cable Tool Drilling Joints

Section 2—Workmanship and Finish

2-a. All machined surfaces shall be finished in a good and workmanlike manner, and shall be free from burrs, rough edges, etc.

2-b. All cable drilling tool joints shall be covered with a suitable lubricant before shipment, to minimize the possibility of corrosion, and shall be adequately protected to prevent damage to threads.

Section 3—Marking

3-a. Cable drilling tool joints manufactured in accordance with these specifications shall be stamped on the collar (with a steel stencil) with the larger dimensions of taper, threads per inch, A.P.I. and A.P.I. monogram. Size of monogram to be one-half inch square. The manufacturer's name shall be stamped on the wrench square.

3-b. For example, the 2¾ by 3¾—7 joint to be marked:

3¾-7 A. P. I.

3-c. No cable drilling tool joints shall be stamped with the A.P.I. monogram that do not comply with these specifications. Authority to use the A. P.I. monogram will be granted in accordance with the rules and conditions contained in the appendix.

Section 4—Basic Thread Form

4-a. Profile. The angle between the sides of the thread is 60 degrees measured in the axial plane, and the thread is perpendicular to the axis of the joint. The crest is truncated on the taper an amount equal to .0155-inch while the root is truncated the same amount parallel to the axis. (See Figure 1.)

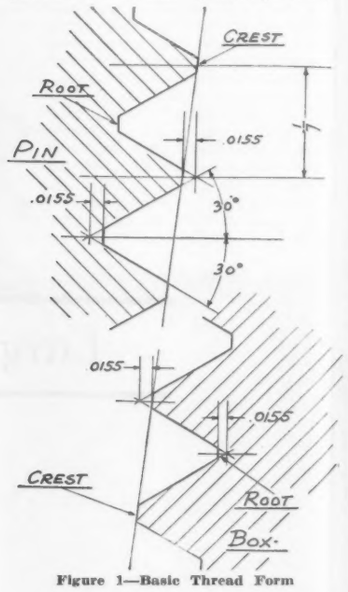


Figure 1—Basic Thread Form

4-b. Pitch. The number of threads per inch is seven, conforming to United States Standard, measured in a direction parallel to the axis of the thread.

4-c. Taper of joints. The taper of the joint is 3 inches per foot or 1 in 4 measured on the diameter.

Section 5—Reference Master Gauges

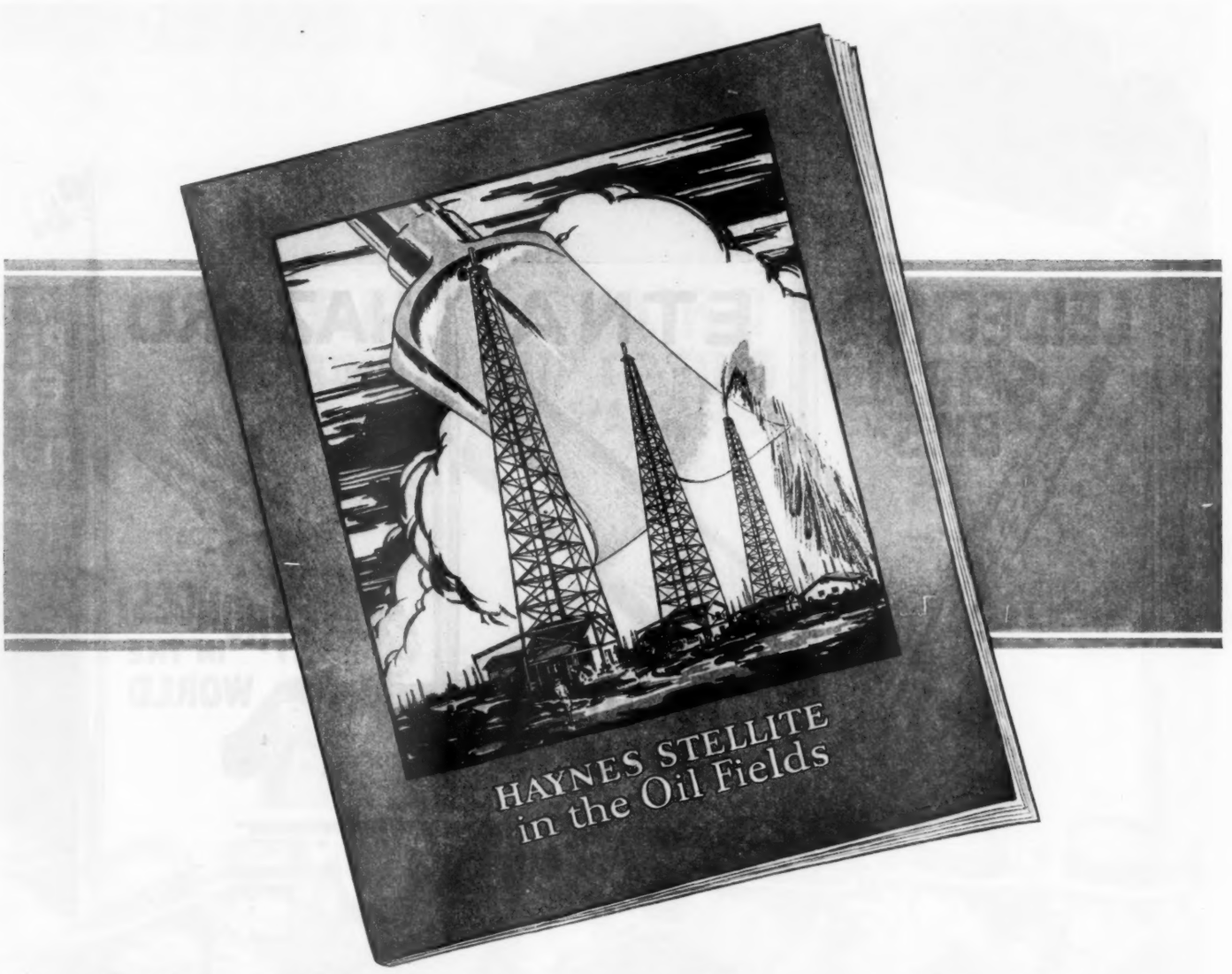
5-a. A.P.I. reference master gauges shall be hardened and ground steel gauges. They may be manufactured with a fitting plate or ring, as illustrated in gauge tables appended. The plug gauge (or master pin gauge) in all cases shall be standard.

5-b. The thread form on these gauges shall be the basic thread form specified for the cable drilling tool joints, except that the crests shall be truncated an amount equal to .020-inch and the roots may be undercut to prevent the gauge from bearing on the crest or root of the thread.

5-c. Anyone desiring to produce A. P.I. standard cable drilling tool joints shall provide himself with reference mas-

F. J. HINDERLITER
Cable Tool Drilling Joints; Rotary Drilling Equipment

A. S. HECK
Cable Tool Drilling Joints



"Hard Facts" about Haynes Stellite

HAYNES STELLITE resists abrasion better than any other metal. This means dollars and cents to every oil well driller.

For Haynes Stellite has been doing great things in the oil fields. Stellited bits will average twice as much hole in similar formations as steel bits.

How does Haynes Stellite reduce drilling costs? What have Stellited drilling tools done in practice? How do you Stellite oil well tools?

These are the questions answered in this booklet — answered in plain language by men who know oil well drilling.

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

DISTRICT SALES OFFICES

CHICAGO—1949 Peoples Gas Bldg.
CLEVELAND—628 Keith Building
DETROIT—4-240 Gen'l Motors Bldg.
HOUSTON—6119 Harrisburg Blvd.
LOS ANGELES—1310 Santee Street
NEW YORK—30 East 42d Street
SAN FRANCISCO—114 Sansome St.
TULSA—Exchange Nat. Bank Bldg.

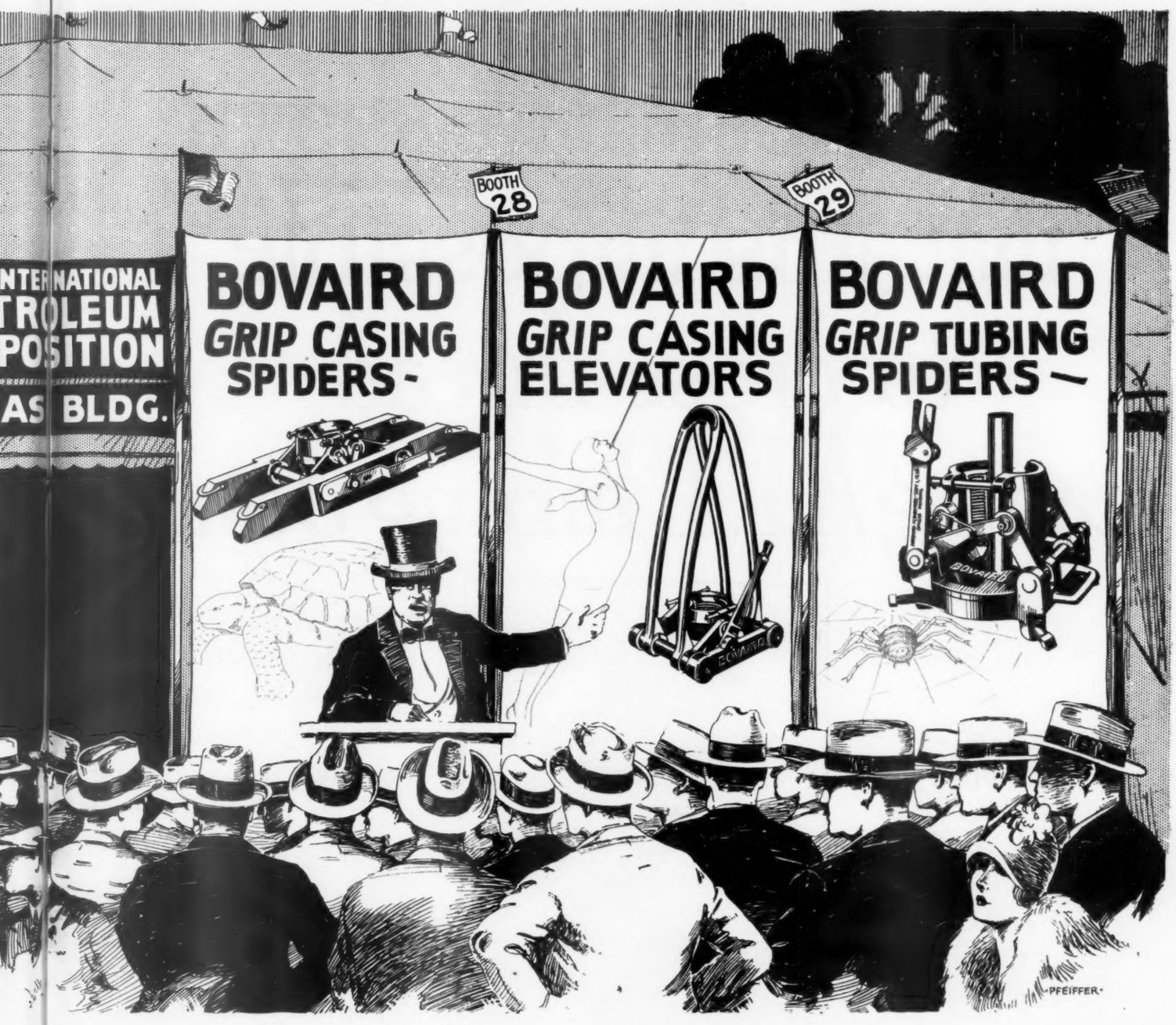
General Offices—Kokomo, Indiana

HAYNES STELLITE

"The Greatest Oil

BOVAIRD

is waiting to greet You—



l Show on Earth"

distributors for:

SUPPLY BOVAIRD COMPANY

Leidecker Spiral Bits
Hazard Wire Lines
Etna Tubular Products
Standard Seamless Tubular Products
Wall Manila Cordage
Republic Belting
Bovaird & Seyfang Boilers and Engines

THE BOVAIRD SUPPLY CO.
904 Mid-Continent Bldg.,
Tulsa, Oklahoma

Field Tests have shown that it is impossible to cross-thread Reading A.P.I. Tubing Joints

THIS is the result of the excellence of the A. P. I. design and Reading workmanship as represented by the beveled lead thread A, the depth of recess B and the starting bevel or seat C. (Also note perfect reaming.)

Reading A. P. I. Tubing, according to field men in California, Oklahoma and Texas, screws together perfectly, and saves labor, due to no crossed threads, ease in stabbing, leakproof joints, and enables long strings to be run in record time. Reading A. P. I. Tubing minimizes number of pulling jobs.

B
C
Reading Genuine Wrought Iron Coupling for 2½ in. - 6½ lb. Reading A. P. I. External Upset Tubing.
NOTE FULL REAM WELL ROUNDED
A
2½ in. - 6½ lb. Reading A. P. I. External Upset Tubing.

The foregoing physical properties plus acknowledged ability to withstand crystallization and corrosion proves Reading A. P. I. Tubing to be the logical solution to all tough production problems.

READING TUBING
GENUINE WROUGHT IRON

READING IRON COMPANY HOUSTON, TULSA, SAN FRANCISCO, SHREVEPORT, LOS ANGELES READING, PENNSYLVANIA

ter gauges which have been manufactured in accordance with the dimensions and tolerances specified in gauge tables appended (See Table 2); such reference gauges to be checked and certified by any A.P.I. custodian or the Bureau of Standards in Washington, form of certificate to be as specified in paragraph 6-j.

5-d. When a manufacturer is prepared and ready to order and use the standard cable drilling tool reference master gauges, he shall apply to the American Petroleum Institute for a certificate of authority to use the official A.P.I. monogram, for each size of gauge desired, as shown in appendix, which shall be his authority to purchase and use such gauges.

5-e. The American Petroleum Institute shall, upon receipt of an application for certificate, issue a certificate in duplicate for each size gauge, the duplicate to be sent with the order to the reference master gauge manufacturer, who is to be instructed that such will be his authority to furnish.

5-f. The original certificate shall be kept by the manufacturer to whom issued as his authority to use the official monogram of the American Petroleum Institute on cable drilling tool joints.

5-g. All cable drilling tool joint reference master gauges shall be consecutively numbered by the manufacturer, the numbers to be supplied on the certificate issued by the American Petroleum Institute.

5-h. The American Petroleum Institute shall keep a careful record of the certificates, sizes and numbers of reference master gauges and to whom furnished.

5-i. The American Petroleum Institute shall furnish to each cable drilling tool joint manufacturer who has purchased and has in use the A.P.I. reference master gauges, a record of all licensed users, showing sizes and numbers.

5-j. Should a manufacturer sell out or dispose of his business, carrying with it officially furnished reference master gauges for the cable drilling tool joints, the purchaser may have the certificates transferred upon request and the return of the old certificates to the American Petroleum Institute.

5-k. Should a reference master gauge for any cable drilling tool joint be destroyed or lost, the manufacturer should return the certificate with explanation to the American Petroleum Institute that their records may at all times be correct.

Section 6—Testing of Reference Master Gauges

6-a. The American Petroleum Institute will provide suitable means for testing reference master gauges to be placed at points to be determined, with reliable custodians where, for a moderate fee, each manufacturer of cable tool joints may have his gauges tested as often as he desires, but to be not less than once a year, because the burden of keeping the working gauges to true form and sizes will rest with the manufacturer. (See list of custodians.)

6-b. These tests shall consist of the following:

6-c. The test for general size shall be made by screwing the taper plug into the A.P.I. taper ring gauge and measuring the projection of the large end of the plug from the ring. In similar manner the taper ring shall be screwed firmly on the A.P.I. taper plug and a measurement made of the projection of the large end of the plug from the ring. In both cases the projection of the plug from the ring should measure 0.640-inch. (See Figure 2).

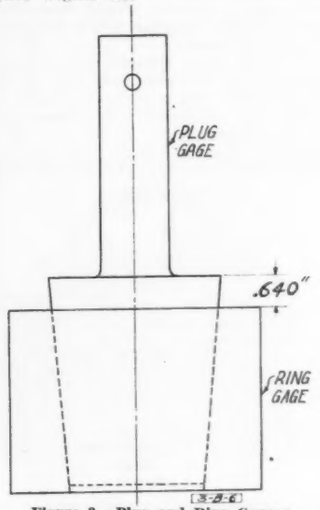


Figure 2.—Plug and Ring Gauges

6-d. The pair of reference gauges being tested, when screwed firmly together should also meet the foregoing requirements. A record of these measurements will be furnished the manufacturer of cable tool joints who submits the reference master gauges for test.

Tolerances on Reference Master Gauges

6-e. New reference master gauges, within the following limits, shall be considered satisfactory:

(a) Projection of any plug gauge from its mating ring shall be

Minimum .639-inch
Maximum .641-inch

(b) Projection of any plug or ring gauge interchanged with any other ring or plug gauge, including A.P.I. reference master gauges, shall be

Minimum .637-inch
Maximum .643-inch

(Special Note: This is a test on projection only. For permissible limits on other elements, see gauge tables appended).

General Instructions for Testing

6-f. During the test all pieces entering into the measurement shall be at a uniform temperature near 68 degrees Fahrenheit.

6-g. Gauges shall be benzol cleaned before mating and made up with a thin film of sperm oil wiped on the threads with clean chamois skin or bristle brush.

6-h. The pair shall be mated hand tight without spinning into place, and complete register shall be accomplished with the torque hammer specified for each size. (See table of weights below and Figure 3).

Table of Weights

2-pound weight for 2⅝ and 3-inch gauge.
3-pound weight for 3¼-3½-3¾-4 and 4¼-inch gauge.
4-pound weight for 4½-5-5½ and 6-inch gauge.

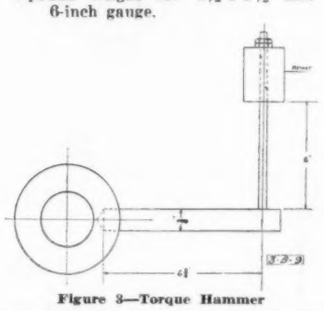


Figure 3—Torque Hammer

6-i. The number of torque hammer blows is unimportant. Sufficient number should be made so that continued hammering will not move ring relative to plug.

Reports on Tests of Reference Master Gauges

6-j. The report on tests of reference master gauges shall be made in the following form:

Test of .....Cable Tool Joint Reference Master Gauges.
Size .....No. .....Date .....
Tested by .....at .....

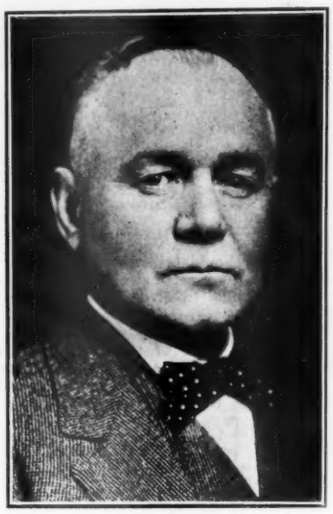
	Ring or Shell of Gauge	Plug or Pin of Gauge
Projection from A.P.I. Gauge		
Record of gauges to be tested:		
Projection before testing with A.P.I. gauges		

Section 7—Method of Guaging Boxes and Pins

7-a. The taper threads in the box and on the pin shall be sized with standard gauges, as illustrated (See Figures 4, 5 and 6). These gauges shall be accurate copies of the A.P.I. master gauges.

7-b. Boxes produced with A.P.I. plug gauges may be made with a tolerance of .005. In this practice the plug gauge might protrude from the face of the box .005 of an inch, or the faces of both plug and box flush with one another. (See Figure 5). Pins produced with a ring member of A.P.I. gauges will be permitted to have a standoff value between the faces of the pin and the face

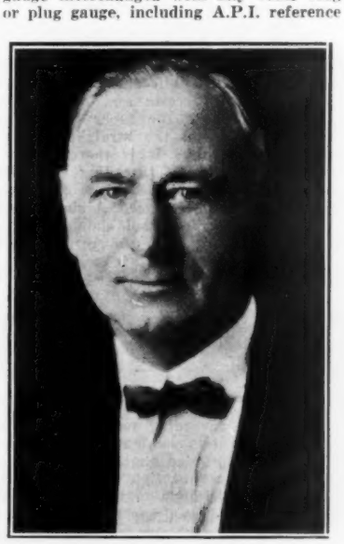
C. L. BULLOCK
Cable Tool Drilling Joints



W. H. KESSELMAN
Cable Tool Drilling Joints

EDWARD TIMBS
Standard Rigs and Derricks; Tubular Goods; Rotary Drilling Equipment; Rig Irons

CHARLES H. MESSIMER
Cable Tool Joints



W. S. GEARY
Cable Tool Joints

J. E. WINTERS
Cable Tool Joints

of the ring, varying from .625 to .637. (See Figure 6).

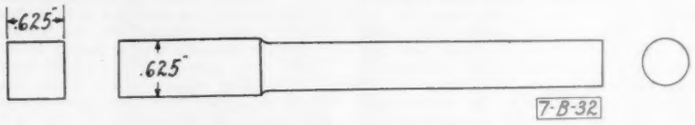


Figure 4—Finger Gauge or Feeler

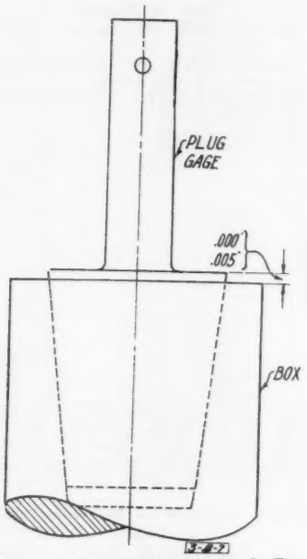


Figure 5—Plug or Pin of Gauge in Box

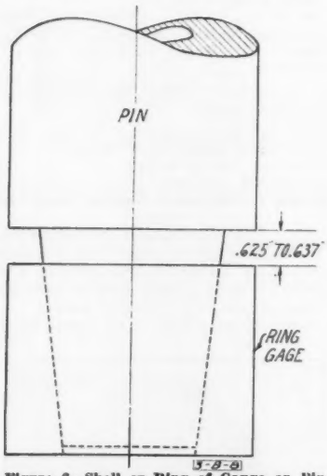


Figure 6—Shell or Ring of Gauge on Pin

Section 8—Recommended Practice for Turning Threads

8-a. The following notes are not to be construed as a definite recommendation for the turning of the threaded joint. They are, however, a generally accepted method which is capable of producing acceptable material.

Setting Taper of Lathe

8-b. Point 1. The alignment of the lathe spindle with the ways should be within .0015-inch per foot. A light finishing chip on a cylindrical bar supported only by the spindle while turning, should measure parallel within .003-inch per foot on diameter.

8-c. Point 2. The alignment of the tail center and tail stock should be completely adjusted. Turning a cylindrical bar on centers and measuring for parallelism of the finishing cut will indicate the amount and direction of the required laterial adjustment of the tail stock.

8-d. When Points 1 and 2 have been checked, the taper bar may be set with the help of a tapered mandrel gauge. (See Figure 7). This is rotated on the centers and the movement of the tool slide is indicated by a dial gauge mounted in the tool post and bearing on the taper mandrel gauge. The taper bar is clamped in the position which gives no movement of the indicator when the tool carriage is moved along the ways.

8-e. To insure alignment of work supported at the outer end by a steady rest, an outside diameter should first be turned on centers (or at least with the tail center) and the steady frame adjusted on this diameter before disengaging the tail center.

8-f. The most reliable and accurate method of determining taper is to gauge the threaded work directly by means of double plug and double ring gauges which measure taper only. It will require a male and female pair of this style of gauge for each size and the method is

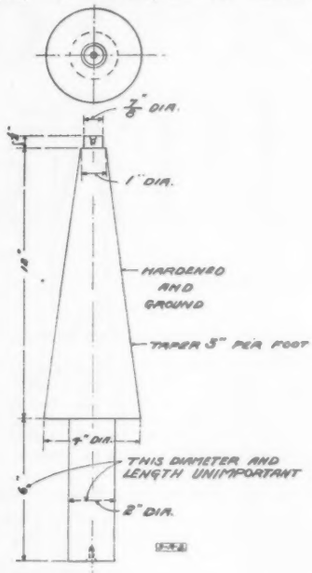


Figure 7—Taper Mandrel for Testing Accuracy of Taper Attachment on Engine Lathe

considerably more expensive than the method outlined in paragraphs (8-b), (8-c), (8-d) and (8-e).

Setting the Threading Tool

8-g. Threads made to the full basic form as specified will develop an interference between crests and roots when assembled, due to the taper truncation of the crests and the straight truncation of the roots. It is therefore recommended that the threading tools be truncated an amount equal to .013-inch to avoid this interference. A simple tool form gauge, as illustrated, should be provided to insure the proper shape of threading tools. (See Figure 8).

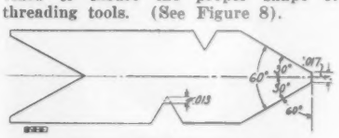


Figure 8—Tool-Form Gauge

8-h. The threading tool should be ground with two straight cutting edges including the thread angle of 60 degrees. It should shut out light when matched into the female angle of the center gauge. The tip should be dressed off no further than the .013-inch truncation indicated on the center gauge. (See Figure 9).

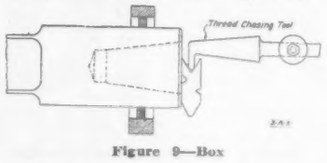


Figure 9—Box

8-i. To reproduce the form of the tool in the work exactly, the upper plane of the cutting point should pass through the work axis. This is most conveniently measured when the upper plane is horizontal and at the same height as the lathe center. A size block, or height gauge resting on the lathe cross slide is a good method to insure proper height of tool. No top rake should be used unless the angle of the tool point is properly compensated to produce an accurate thread form.

8-j. The 60-degree point is set square with axis of work by matching into center gauge while gauge is aligned on some machined surface of the lathe, or of the piece which is being threaded, which surface is known to be accurately parallel or square with the lathe ways. (See Figures 9 and 10, etc.).

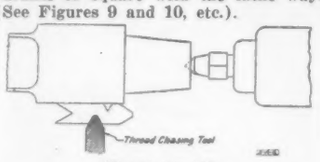


Figure 10—Pin

8-k. It should be borne in mind that this method of setting for thread form is liable to be in error by as much as 25 minutes of arc even when extraordinary care is used.

8-l. The root of the thread should clear the .017 flat on the gauge as in Figure 11 to insure non-interference with the crest of the mating thread.

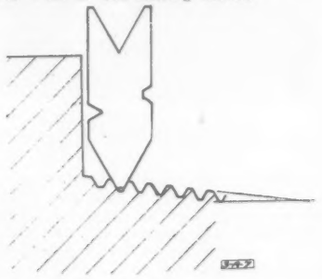


Figure 11

Section 9—Grand Master and Special Reference Master Gauges

9-a. The set of A.P.I. grand master gauges for cable tool joints shall be deposited at the Bureau of Standards at Washington, D. C., and the special reference master gauges held by custodians for testing purposes shall be tested against the grand master gauges from time to time as may be desirable.

9-b. The master gauges shall be hardened and ground steel gauges developed from the I. & H. master gauges furnished by the Oil Well Supply Co. The plug or pin master gauges in all cases shall be the standard.

9-c. Since the adoption of this specification in October, 1924, the A.P.I. grand master and special reference master gauges (to be owned by the American Petroleum Institute) have been selected and approved by the Bureau of Standards, and are deposited with custodians.

Section 10

10-a. Disputes. In case of any dispute regarding the accuracy of any A.P.I. gauge listed hereunder, it shall be referred to the Bureau of Standards. Washington, D. C., for final decision.

10-b. New sizes of cable drilling tool joints. Should larger or smaller sizes of joints than now adopted be required, it shall be the duty of the American Petroleum Institute to develop them, that such might immediately become a standard and when a new joint is developed every manufacturer will be immediately notified.

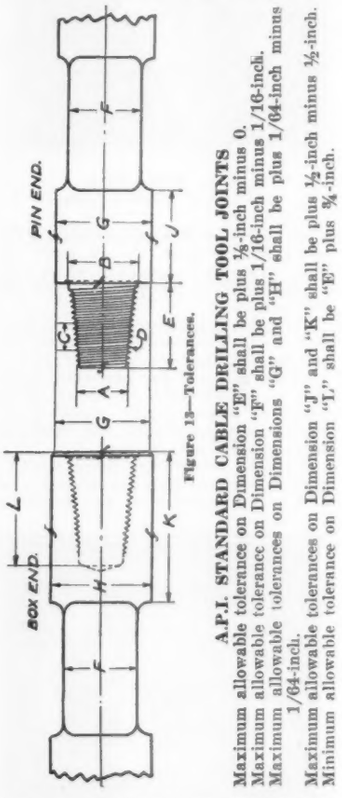
10-c. Inspection. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacture of the material ordered hereunder. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

10-d. Where inspector representing the purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

10-e. Rejection. Material manufactured in accordance with these specifications which proves to be defective subsequent to acceptance at manufacturer's works or when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A.P.I. material. When material stamped or marked with the A.P.I. monogram is rejected, such monogram shall be cancelled as follows:

10-f. A steel cancelling stencil, one-half inch square, per Figure 12, shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

Figure 12
A.P.I. standard cancelling stencil.



A.P.I. STANDARD CABLE DRILLING TOOL JOINTS

Maximum allowable tolerance on Dimension "E" shall be plus 1/64-inch minus 0.
Maximum allowable tolerance on Dimension "F" shall be plus 1/16-inch minus 1/16-inch.
Maximum allowable tolerances on Dimensions "G" and "H" shall be plus 1/64-inch minus 1/64-inch.
Maximum allowable tolerances on Dimension "J" and "K" shall be plus 1/32-inch minus 1/32-inch.
Minimum allowable tolerance on Dimension "L" shall be "E" plus 3/64-inch.

Figure 13—Tolerances.

Tolerance on A.P.I. Cable Drilling Tool Joint Gauges

Plug

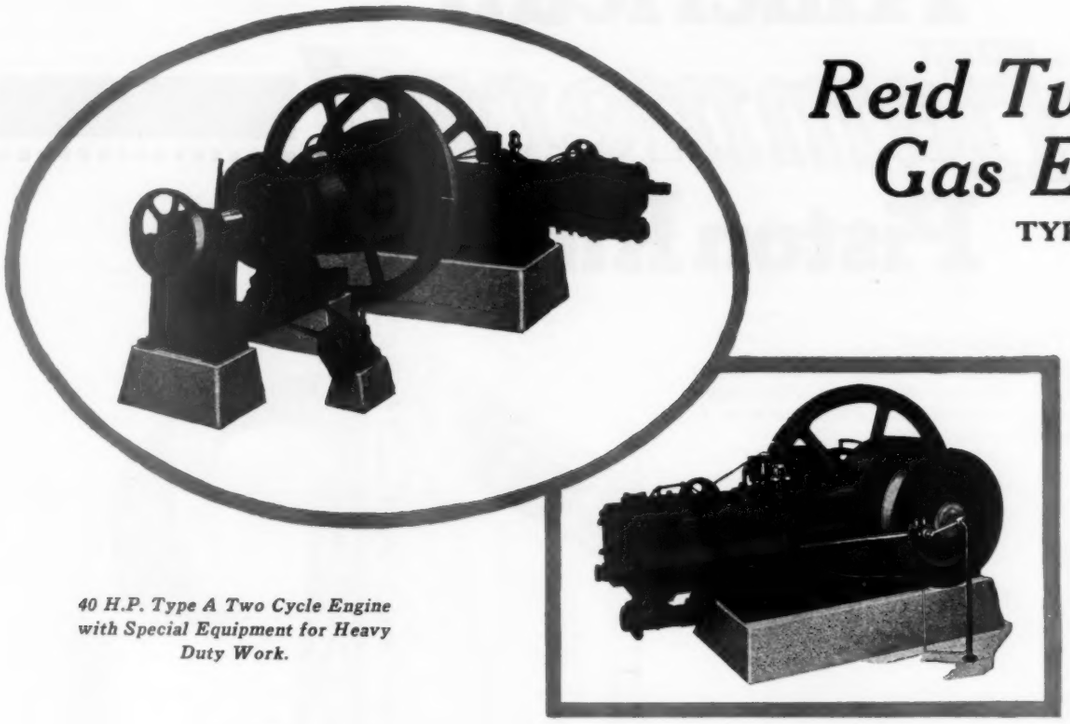
1. The plug shall be the control.

2. The lead may vary ± 1/10000 inch per inch of length from basic, and shall be measured over a length of axis beginning and ending not less than one-half inch from the ends of the threaded portion, but the tolerance for gauges, the TR length of which is less than 4 inches, shall be ±4/10000 inch from basic.

Ex. 1. A 4¼ by 6-inch plug lead measures 4.9995 for 42 threads, giving a minus error of .0005 inch in 6 inches, which is allowable.

Ex. 2. A 1⅝ by 2⅝-inch plug lead measures 1.9997 for 14 threads, giving a minus error of .0003-inch in 2 inches, or .0005-inch in the full threaded length of 3¼ inches, which exceeds the allowable tolerance of +.0004-inch, and is not allowable.

3. The included taper on diameter in the length TR shall lie between the limits (basic) and (basic +TR/10000 inches) and shall be measured over a length of axis beginning and ending not less than one-half inch from the ends of the threaded portion, but the limits for gauges, the TR length of which is less than 4 inches.



40 H.P. Type A Two Cycle Engine with Special Equipment for Heavy Duty Work.

Reid Two Cycle Gas Engines

TYPE A

THE Reid Engine, pictured above, is specially equipped for Heavy Duty and continuous operation. This equipment consists of the Number 50 Reverse Rig, with 5″ diameter shaft, Band Clutch and Pulley Brake, strongly built with adequate strength for Heavy Duty Work. The Pickering Governor gives a close speed regulation and smoothness of operation. The Dust Cover, enclosing the main rod and cylinder, protects these parts from the sand and dust. The advantages of the Disc Wheel—smooth and steady in operation and may be left on the engine in shipping. The standard wheel may be furnished if desired.

Write for descriptive Bulletin or inquire of any field representative

JOSEPH REID GAS ENGINE COMPANY

OIL CITY, PENNSYLVANIA, U. S. A.

BRANCHES AND AGENCIES—Marietta, Ohio; Logan, Ohio; Newark, Ohio; Shreveport, La.; Charleston, W. Va.; R. B. Moore, Bolivar, N. Y.; Frick & Lindsay Co., Bradford, Penna., and Kentucky Distributors; S. R. Shoup, 724 Board of Trade Bldg., Los Angeles, Cal.; Frick-Reid Supply Company, Tulsa, Oklahoma, and Branches, Distributors for Oklahoma, Kansas, Texas, Arkansas and Wyoming. Branch Shop, Tulsa, Okla.

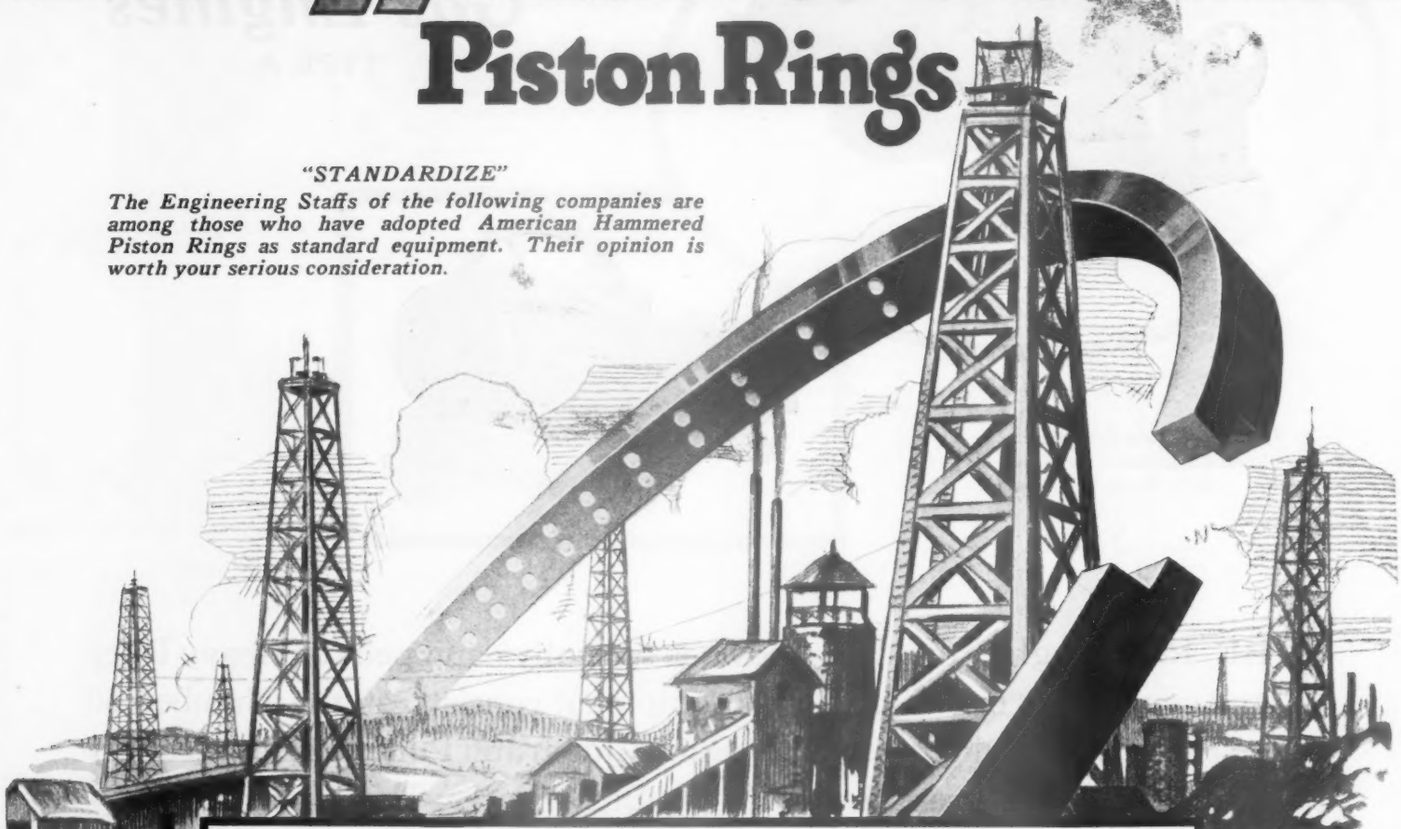
EXPORT SALES REPRESENTATIVE: Oil Field Equipment Co., Inc., 30 Church St., New York City

REID OIL FIELD MACHINERY

American Hammered Piston Rings

"STANDARDIZE"

The Engineering Staffs of the following companies are among those who have adopted American Hammered Piston Rings as standard equipment. Their opinion is worth your serious consideration.



Endorsed and used as Factory Equipment by---

Ajax Iron Works, Corry Pa.
Bruce-Macbeth Eng. Co., Cleveland, O.
Bovaird & Seyfang Mfg. Co., Bradford, Pa.
Bradford Supply Co., Bradford, Pa.
C. & G. Cooper Co., Mount Vernon, Ohio
Chicago Pneumatic Tool Co., New York, N. Y.
Clark Bros., Olean, N. Y.
Franklin Valveless Eng. Co., Franklin, Pa.
Ingersoll-Rand Co., New York, N. Y.
McIntosh & Seymour Corp., Auburn, N. Y.
Muncie Oil Eng. Co., Muncie, Ind.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Power Mfg. Co., Marion, O.
Jos. Reid Gas Eng. Co., Oil City, Pa.
Titusville Iron Works, Titusville, Pa.
Worthington Pump & Mach. Corp., New York, N. Y.

May be obtained from the above companies, or their selling agents, in standard sizes or oversizes.

Rings for any engine or compressor not listed above can be obtained direct from us.

The AMERICAN HAMMERED PISTON RING CO. BALTIMORE, MD.

shall be (basic) and (basic + 4/10000 inches).

Ex. 1. A 4¼ by 6-inch plug measured over 4 inches of axis gives a difference of diameter readings of 1.0003 inches. This error increased in proportion to the TR length $(.0003)(\frac{6.5}{4})=.00048$ which is allowable, since the maximum plus error is TR/10000 = .00065.

Ex. 2. A 1⅝ by 2⅝-inch plug measured over 2 inches of axis gives a difference of diameter readings of .5003-inch. This error increased in proportion to the TR length $(\frac{.0003}{2})(3)=.00045$-inch, which exceeds the allowable tolerance of + .0004-inch, and is not allowable.

4. The flanks of the thread may vary from the basic angle of 30 degrees to the normal by not more than ±7 min. of arc.

5. The pitch diameter at the gauge point shall lie between the limits (basic ±TR/10000 inches), but the limits for gauges, the TR length of which is less than 4 inches, shall be (basic ±4/10000 inches).

6. The above tolerances are subject to the additional condition that the plug must screw into a regional A.P.I. reference master to a step value between the limits .637 and .643.

Ring

1. The ring shall be controlled by its engagement with the mating plug.

2. The step value may vary between the limits .639 inch and .641 inch.

3. The included taper on diameter in the length TR shall lie between the limits (basic-4/10000 inches) and (basic-12/10000 inches) for all sizes, and shall be measured over a length of axis beginning and ending not less than one-half inch from the ends of the threaded portion.

4. The above tolerances are subject to the additional condition that the ring must screw onto a regional A.P.I. reference master to a step value between the limits .637 inch and .643 inch.

5. The flanks of the thread may vary from basic angle of 30 degrees to the normal by not more than ±15 min. arc.

TABLE 1
DIMENSIONS OF A. P. I. CABLE DRILLING TOOL JOINTS
See Fig. 13

All dimensions in inches at 68 degrees Fahr.

A x B	C	D	E	F	G	H	J and K				
Nominal Size of Taper Joint	Number Threads per Inch	Type of Thread	Length of Taper Pin	Size of Wrench Square	Diam. of Pin Collar	Diam. of Box Collar	Length of Collars	For Stems	For Drilling and Fishing Jars	For Drilling Bits	For Fishing Tools and Substitutes
1⅝"x2⅝"	7	Flat U. S. Form	3½"	2⅜"	3⅜"	3⅜"	Pin Collars J	4"	4"	7"	4"
							Box Collars K	7"	6"	——	6"
2"x3"	7	Flat U. S. Form	4"	3¼"	4¼"	4⅜"	Pin Collars J	5"	4½"	7½"	4½"
							Box Collars K	9"	7"	——	7"
2¼"x3¼"	7	Flat U. S. Form	4"	3⅜"	4½"	4¾"	Pin Collars J	5½"	4½"	8"	4½"
							Box Collars K	9½"	7"	——	7"
2½"x3½"	7	Flat U. S. Form	4¼"	4"	5"	5¼"	Pin Collars J	6"	5"	8½"	5"
							Box Collars K	10"	7"	——	7"
2¾"x3¾"	7	Flat U. S. Form	4½"	4"	5¼"	5½"	Pin Collars J	6"	5"	8½"	5"
							Box Collars K	11"	8"	——	8"
3"x4"	7	Flat U. S. Form	4¾"	4½"	6"	6¼"	Pin Collars J	6½"	5½"	9"	5½"
							Box Collars K	11"	8"	——	8"
3¼"x4¼"	7	Flat U. S. Form	5"	5"	6¼"	6½"	Pin Collars J	7"	6"	10"	6"
							Box Collars K	12"	9"	——	9"
3½"x4½"	7	Flat U. S. Form	5½"	5"	6½"	6¾"	Pin Collars J	7"	6"	10"	6"
							Box Collars K	12"	9"	——	9"
4"x5"	7	Flat U. S. Form	5½"	5½"	7"	7⅛"	Pin Collars J	7½"	6½"	11"	6½"
							Box Collars K	12"	10"	——	10"
4"x5⅛"	7	Flat U. S. Form	6½"	5½"	7⅛"	7⅜"	Pin Collars J	7½"	6½"	11"	6½"
							Box Collars K	12"	10"	——	10"
4¼"x6"	7	Flat U. S. Form	7"	6"	8¼"	8¼"	Pin Collars J	8"	7"	12"	7"
							Box Collars K	13"	10"	——	10"

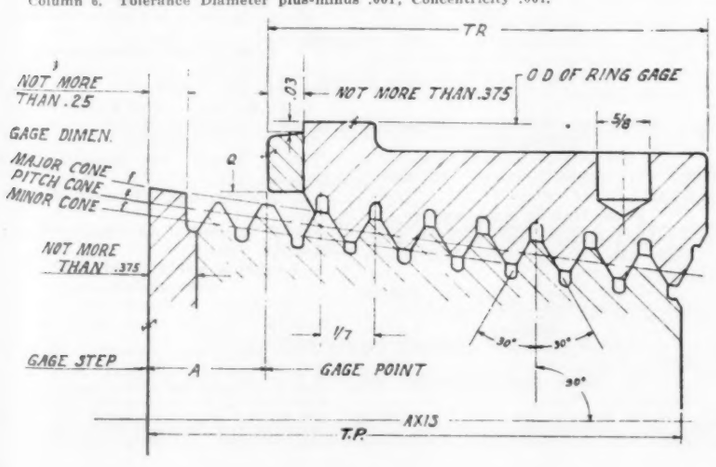
TABLE 2
GAUGE DIMENSIONS FOR A.P.I. STANDARD CABLE DRILLING TOOL JOINTS
See Figure 14

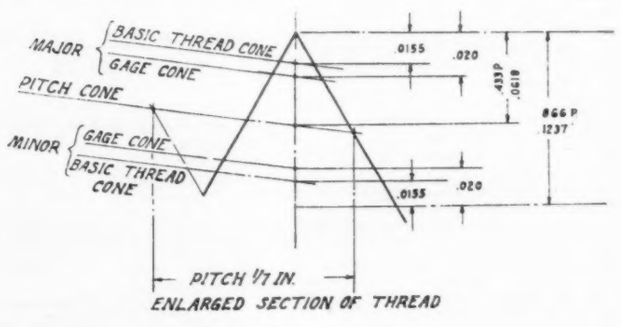
All dimensions in inches at 68 degrees Fahrenheit

	1	2	3	4	5	6	7	8
Nominal Size of Tapered Joint	Pitch Dia. at Gau. Pt.	Mjr. Cone Dia. at Gau. Step	Min. Cone Dia. at Gau. Pt.	Total Lgth. Plug Gauge TF	Total Lgth. Ring Gauge TR	Outside Dia. of Ring Gauge O.D.	Diameter of Recess Q	Step Value A
1⅝ x 2⅝	2.4401	2.6838	2.3564	3½	3	3.750	2.57	.640
2 x3	2.8675	3.1112	2.7838	4	3-5/8	4.250	3.00	.640
2¼ x3¼	3.0402	3.2839	2.9565	4	3-5/8	4.500	3.17	.640
2½ x3½	3.3383	3.5820	3.2546	4¼	3-3/4	5.000	3.47	.640
2⅝ x3⅝	3.5772	3.8210	3.4936	4½	4-1/16	5.250	3.72	.640
3 x4	3.7507	3.9944	3.6670	4¾	4-5/16	6.000	3.98	.640
3¼ x4¼	4.0535	4.2972	3.9698	5	4-5/8	6.250	4.19	.640
3½ x4½	4.4171	4.6608	4.3334	5⅛	5-1/8	6.500	4.55	.640
4 x5	4.8188	5.0625	4.7351	5⅛	5-1/8	7.000	4.95	.640
4 x5⅛	5.2671	5.5108	5.1834	6⅛	6-1/8	7.500	5.40	.640
4¼ x6	5.7657	6.0094	5.6820	7	6-1/2	8.250	5.90	.640

Column 1. As established from Bureau of Standards Measurement.
Column 2. Equal Column 1 + .160 + .0837; Tolerance plus-minus .002.
Column 3. Equals Column 1 — .0837; Tolerance plus-minus .002.
Column 4. Tolerance plus-minus .094.
Column 5. Tolerance plus-minus .094.
Column 6. Tolerance Diameter plus-minus .001; Concentricity .001.

A.P.I. REFERENCE MASTER
CABLE DRILLING TOOL JOINT GAGES





SLOPE OF CONES TO AXIS = 1/8 OR INCLUDED TAPER = 1/4
ALL MEASUREMENTS IN INCHES STD. AT 68° FAHR.

Figure 14

MEMBERS OF STANDARDIZATION COMMITTEES OF THE INSTITUTE

Members of the various committees of the American Petroleum Institute on the standardization of oil field equipment are as follows:

BELTING

Members of the special committee of the American Petroleum Institute on the standardization of belting for oil country use are:

A. H. Riney chief engineer, Phillips Petroleum Co., Bartlesville, Okla., national chairman.

Paul Endacott, Phillips Petroleum Co., Bartlesville, Okla., national secretary.

Eastern District Subcommittee
(Pennsylvania, West Virginia, Ohio, Illinois and Indiana)

This committee to be appointed later.

Mid-Continent District Subcommittee
(Oklahoma and Kansas)

Ray Skinner, Skinner Belt Co., Tulsa, Okla., chairman.

Members

R. E. Andrews, Pure Oil Co., Tulsa, Okla.

E. L. Bell, Shaffer Oil & Refining Co., Drumright, Okla.

Emery Cook, Twin States Oil Co., Tulsa, Okla.

H. O. Helvie, Carter Oil Co., Tulsa, Okla.

Glenver McConnell, Roxana Petroleum Corp., Tulsa, Okla.

C. C. McMamare, Sinclair Oil Co., Tulsa, Okla.

A. F. Rose, Tidal Oil Co., Tulsa, Okla.

D. L. Trax, Gypsy Oil Co., Tulsa, Okla.

John A. Wolfe, Prairie Oil & Gas Co., Tulsa, Okla.

John P. Winters, National Refining Co., Eldorado, Kans.

Louisiana-Arkansas District Subcommittee

W. C. Taylor, Standard Oil Co. of Louisiana, Shreveport, La., chairman.

Members

A. R. Edsel, Louisiana Oil & Refining Co., Shreveport, La.

D. B. Harris, Humble Oil & Refining Co., Shreveport, La.

P. P. Stagg, Gulf Refining Co., Shreveport, La.

Texas District Subcommittee

J. R. Penn, Texas Pacific Coal & Oil Co., Fort Worth, Tex., chairman.

Mel Shugert, St. Clair Oil Co., Fort Worth, Tex., vice chairman.

Members

Jim Bowers, Pure Oil Co., Mexia, Tex.

Robert Burnett, Humble Oil & Refining Co., Houston, Tex.

J. F. Champion, Prairie Oil & Gas Co., Ranger, Tex.

Chares Homer, Rio Bravo Oil Co., Houston, Tex.

F. R. Oldham, Gulf Production Co., Houston, Tex.

William Thomas, Humble Oil & Refining Co., Houston, Tex.

R. B. Newberry, Lone Star Gas Co., Dallas, Tex.

Rocky Mountain District Subcommittee
(Wyoming, Montana and Colorado)

Frank Prior, Midwest Refining Co., Casper, Wyo., chairman.

Members

A. G. Fidel, Midwest Refining Co., Casper, Wyo.

J. W. Jordan, Sinclair Wyoming Oil Co., Casper, Wyo.

R. B. Leggett, The Texas Company, Casper, Wyo.

R. W. Loucks, Carter Oil Co., Casper, Wyo.

***California District Subcommittee**

J. A. Jones, Associated Oil Co., Los Angeles, Calif., chairman.

Members

H. H. Anderson, Shell Co. of California, Higgins Bldg., Los Angeles, Calif.

W. B. Blodget, Chanslor-Canfield Midway Oil Co., Los Angeles, Calif.

S. J. Dickey, General Petroleum Corp. of California, Higgins Bldg., Los Angeles, Calif.

W. R. Guiberson, The Guiberson Corp., 1506 Santa Fe Avenue, Los Angeles, Calif.

L. C. Hampton, Union Oil Co., Union Oil Building, Los Angeles, Calif.

W. C. Wickersham, Belridge Oil Co., 1106 Bank of Italy Building, Los Angeles, Calif.

Manufacturers' Subcommittee

Z. F. Harshton, Imperial Belting Co., Chicago, Ill., chairman.

Members

J. A. Fenwick, Fenwick-Reddaway Manufacturing Co., Newark, N. J.

Charles E. Hathaway, Stanley Belting Co., Chicago, Ill.

B. A. Keiley, R. & J. Dick Co., Passaic, N. J.

C. O. Streeter, Graton & Knight Manufacturing Co., Worcester, Mass.

Engineering Subcommittee

D. L. Trax, Gypsy Oil Co., Tulsa, Okla., chairman.

Members

E. L. Bell, Shaffer Oil & Refining Co., Tulsa, Okla.

G. H. Bowlus, General Petroleum Corp. of California, Higgins Building, Los Angeles, Calif.

Robert Burnett, Humble Oil & Refining Co., Houston, Tex.

Glenver McConnell, Roxana Petroleum Corp., Tulsa, Okla.

F. O. Prior, Midwest Refining Co., Casper, Wyo.

Rubber Association of America Subcommittee

N. G. Bruce, Goodyear Tire & Rubber Co., Akron, Ohio, chairman.

(Continued on following page)

*This committee represents the main standardization committee of the Chamber of Mines and Oil, Los Angeles, Calif., which committee, under the chairmanship of C. C. Scharpenberg, is handling all standardization matters for the California and Pacific Coast district in co-operation with the American Petroleum Institute.

Members

W. W. Evans, B. F. Goodrich Co., Akron, Ohio.

A. D. Kunze, assistant secretary, Rubber Association of America, New York City.

OIL FIELD BOILERS

Members of the special committee of the American Petroleum Institute on the standardization of oil field boilers are:

S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif., national chairman.

Charles Jacobsen, Barnsdall Oil Co., Tulsa, Okla., national vice chairman.

L. W. Voorhees, Union Oil Co. of California, Los Angeles, Calif., national secretary.

Eastern District Subcommittee
(Pennsylvania, West Virginia, Ohio, Illinois and Indiana)

S. C. Preston, Hope Natural Gas Co., Pittsburgh, Pa., chairman.

Members
(To be appointed)

Mid-Continent District Subcommittee
(Oklahoma and Kansas)

Charles Jacobsen, Barnsdall Oil Co., Tulsa, Okla., chairman.

Members

E. J. Gorman, Twin States Oil Co., Tulsa, Okla.

G. C. Pohler, Mid-Continent Petroleum Corp., Tulsa, Okla.

W. J. Ricketts, Amerada Petroleum Corp., Tulsa, Okla.

John Sexton, Phillips Petroleum Co., Bartlesville, Okla.

John A. Wolfe, Prairie Oil & Gas Co., Tulsa, Okla.

Texas District Subcommittee

W. V. Bowles, The Texas Company, Houston, Tex., chairman.

Members

S. P. Farish, Farish, Watts, Collins & Crosby, Humble Building, Houston, Tex.

Eugene Holman, Humble Oil & Refining Co., Houston, Tex.

J. E. Hooper, Sinclair Oil & Gas Co., Chronicle Building, Houston, Tex.

F. J. McNally, Marland Oil Co., Cotton Exchange Building, Houston, Tex.

M. F. Yount, Yount Lee Oil Co., Beaumont, Tex.

Louisiana and Arkansas District Subcommittee

B. M. Nowery, The Palmer Corp., Shreveport, La., chairman.

Members

C. M. Bennett, Louisiana Oil & Refining Co., Shreveport, La.

E. D. Holcomb, Fortuna Oil Co., Shreveport, La.

J. S. McCullough, Triangle Drilling Co., Shreveport, La.

Rocky Mountain District Subcommittee
(Wyoming, Montana and Colorado)

William Holland, Ohio Oil Co., Casper, Wyo., chairman.

Members

J. W. Jordan, Sinclair Wyoming Oil Co., Casper, Wyo.

J. J. Durst, Oil Well Supply Co., Casper, Wyo.

A. W. Peake, Midwest Refining Co., Casper, Wyo.

W. R. Shepherd, Continental Supply Co., Casper, Wyo.

L. Sonntag, The Mutual Oil Co., Casper, Wyo.

Manufacturers' Subcommittee

M. H. Broderick, Broderick Co., Muncie, Ind., chairman.

Thomas Fleming, Jr., Oil Well Supply Co., Pittsburgh, Pa., secretary.

Members

J. T. Dillon, Titusville Iron Works, Titusville, Pa.

Hugh Donovan, Jr., Donovan Boiler Works, Parkersburg, W. Va.

***California District Subcommittee**

L. W. Voorhees, Union Oil Co. of California, Los Angeles, Calif., chairman.

Members

W. G. Black, Standard Oil Co. of California, Whittier, Calif.

S. J. Dickey, General Petroleum Corp. of California, Higgins Building, Los Angeles, Calif.

J. L. Glennon, General Petroleum Corp. of California, Los Angeles, Calif.

J. J. Hern, Chanslor-Canfield Midway Oil Co., Los Angeles, Calif.

Charles W. Lieb, Union Oil Co. of California, Los Angeles, Calif.

Special Subcommittee to Confer With A. S. M. E. Boiler Code Committee

S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif., chairman.

Members

M. H. Broderick, Broderick Co., Muncie, Ind.

W. H. Connelly, Mammoth Oil Co., Casper, Wyo.

W. P. Nolder, Lancaster, Ohio.

A. L. Taylor, Clarksburg, W. Va.

J. L. Yerdon, Bradford, Pa.

Mid-Continent District Subcommittee
(Oklahoma and Kansas)

R. E. Andrews, Pure Oil Co., Tulsa, Okla., chairman.

O. V. Borden, secretary, Purchasing Agents Association, 307 South Cincinnati Street, Tulsa, Okla., secretary.

Members

Arthur Brewer, 1021 East Seventh Street, Winfield, Kans.

Charles C. Brown, Kay County Gas Co., Ponca City, Okla.

H. W. David, T. B. Slick Co., Tulsa, Okla.

Lee Hawkins, Marland Oil Co., McCamey, Tex.

*This committee represents the main standardization committee of the Chamber of Mines and Oil, Los Angeles, Calif., which committee, under the chairmanship of C. C. Scharpenberg, is handling all standardization mat.ers for the California and Pacific Coast district in co-operation with the American Petroleum Institute.

Very Little Complaint on Items Recommended as A. P. I. Standards

By CHESTER W. BROWN
Director of Exploration and Production, Union Oil Co. of California

In reviewing the work of standardization for oil country material, I think all of us who have been interested in this work, can view the results with considerable satisfaction and justification for our efforts. When J. Edgar Pew wrote me on December 20, 1922, asking my opinion as to the advisability of getting the California operators together to discuss the adoption of a standard casing for oil wells, I little dreamed that standardization would have been carried so far in such a short time.

California operators are nearly all members of the Chamber of Mines and Oil, and the chamber was used as a clearing house for all the standardization committees. This facilitated the work to a great extent as the secretary of the chamber attended to the correspondence, kept all records and called the committee meetings whenever necessary. So in addition to the initial undertaking to produce better casing for oil country use, standardization has been accomplished on rotary drill pipe, rotary tool joints and other equipment run in connection with drill pipe; rig irons, transmission shafting, with all mating parts; rigs and derricks, standard tool taper joints, pumping equipment, tubing and rods and all the connecting parts thereto, oil field boiler, wire rope, steel storage, etc.

There has been very little complaint on any items that have been recommended as standard by the American Petroleum Institute and the successful performance of standardized items would outweigh any criticism a thousandfold. We can already point to a tremendous saving in the cost of operations due to standardization and interchangeability of equipment and material, and when all the items of standardization that are under consideration at this time are completed and in actual operation, the saving within the industry will be enormous. We believe that in addition to completing standardization of equipment, there is much work to do to educate the operators and the public generally to the value of standardization. There are many places where large stocks of materials must be used up as no one would want to deliberately throw away usable stuff. There are also found some operators and contractors who have not given the subject much thought, but the faster they become acquainted with and start using standardized equipment, the sooner they will increase their profits and cut down the waste that is caused by lack of interchangeability, poor and ill-fitting materials, delays, fishing jobs, failures of materials, lost holes and the many other items of loss too numerous to mention.

Thomas Fleming, Jr., Oil Well Supply Co., Pittsburgh, Pa.

CABLE DRILLING TOOL JOINTS

Members of the special committee of the American Petroleum Institute on the standardization of cable drilling tool joints are:

Thomas Fleming, Jr., Oil Well Supply Co., Pittsburgh, Pa., national chairman.

D. S. Faulkner, Union Tool Co., Torrance, Calif., national vice chairman.

C. T. Mapes, Twenty-first Street Works, Oil Well Supply Co., Pittsburgh, Pa., national secretary.

Eastern District Subcommittee
(Pennsylvania, West Virginia, Ohio, Illinois and Indiana)

S. N. Moyar, Oil City, Pa., chairman.

Members

C. L. Bullock, New Lexington, Ohio.

A. S. Heck, Heck Oil Co., Spencer, W. Va.

C. H. Hubbard, Wright Bldg., Tulsa, Okla.

Charles H. Messimer, Marland Refining Co., Ponca, City, Okla.

P. J. Murray, 1729 South Denver Street, Tulsa, Okla.

J. E. Winters, Wichita, Kans.

Louisiana and Arkansas District Subcommittee

(No committee considered necessary in this district as practically all drilling done by rotary method.)

Texas District Subcommittee

Charles Rhader, Texhoma Oil & Refining Co., Wichita Falls, Tex., chairman.

Tom Morrissey, Panhandle Refining Co., Wichita, Falls, Tex., secretary.

Members

W. S. Geary, Magnolia Petroleum Co., Dallas, Tex.

H. A. Melat, Gulf Production Co., Fort Worth, Tex.

M. B. Sweeney, Sun Oil Co., Dallas, Tex.

Rocky Mountain District Subcommittee
(Wyoming, Montana and Colorado)

George H. Jaques, Midwest Refining Co., Casper, Wyo., chairman.

Members

M. J. Foley, Continental Oil Co., Casper, Wyo.

J. W. Jordan, Sinclair Wyoming Oil Co., Casper, Wyo.

***California District Subcommittee**

D. S. Faulkner, Union Tool Co., Torrance, Calif., chairman.

Members
(To be appointed)

Manufacturers' Subcommittee

C. T. Mapes, Twenty-first Street Works, Oil Well Supply Co., Pittsburgh, Pa., chairman.

Members

H. M. Harris, Lucey Manufacturing Corp., Chattanooga, Tenn.

F. J. Hinderliter, Hinderliter Tool Co., Tulsa, Okla.

W. H. Kesselman, Kesselman & Co., Parkersburg, W. Va.

C. R. Phillips, Charles Phillips Tool Co., Mannington, W. Va.

E. H. Williams, Union Tool Co., Carnegie, Pa.

William Wright, Oklahoma Iron Works, Tulsa, Okla.

Subcommittee on Gauges

C. T. Mapes, Oil Well Supply Co., Pittsburgh, Pa., chairman.

Members

H. W. Bearce, Bureau of Standards, Washington, D. C.

Spencer B. Terry, Pratt & Whitney Co., Hartford, Conn.

E. H. Williams, Union Tool Co., Carnegie, Pa.

STANDARD RIGS AND DERRICKS

Members of the special committee of the American Petroleum Institute on the standardization of standard rigs and derricks are:

W. W. Fondren, Humble Oil & Refining Co., Houston, Tex., national chairman.

A. M. Bowman, Humble Oil & Refining Co., Houston, Tex., national secretary.

Eastern District Subcommittee
(Pennsylvania, West Virginia, Ohio, Illinois and Indiana)

I. L. Neely, Empire Gas & Fuel Co., Wooster, Ohio, chairman.

Members

J. N. Corrin, Hope Natural Gas Co., Pittsburgh, Pa.

Ralph W. Gallagher, East Ohio Gas Co., Cleveland, Ohio.

Mid-Continent District Subcommittee
(Oklahoma and Kansas)

J. J. Conry, Carter Oil Co., Tulsa, Okla., chairman.

Frank H. Dunn, H. F. Wilcox Oil & Gas Co., Tulsa, Okla.

J. S. Freeman, Skelly Oil Co., Tulsa, Okla., vice chairman.

C. D. Watson, Carter Oil Co., Tulsa, Okla., chairman.

Members

C. P. Dimit, Gypsy Oil Co., Tulsa, Okla.

H. A. Hodgson, Gypsy Oil Co., Tulsa, Okla. (Alternate to Mr. Dimit.)

George Moody, The Cosden Co., Tulsa, Okla.

Texas District Subcommittee

J. H. Tucker, Gulf Production Co., Houston, Tex., chairman.

G. C. Buchanan, Gulf Production Co., Houston, Tex., secretary.

Members

W. V. Bowles, The Texas Company, Houston, Tex.

H. B. Gunn, Gunn Brothers, Houston, Tex.

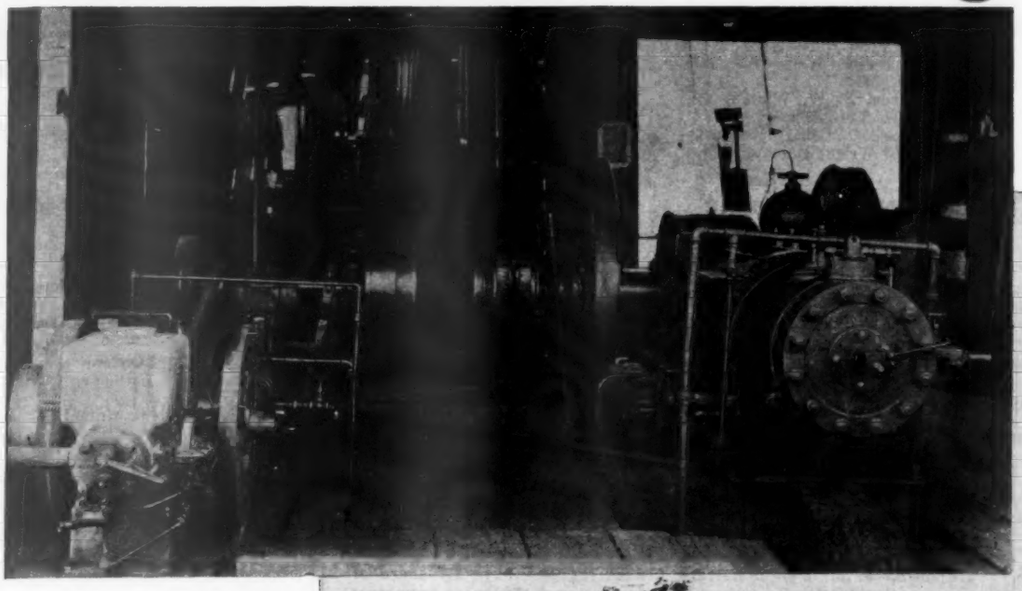
J. H. Russell, Gulf Production Co., Houston, Tex.

Louisiana and Arkansas District Subcommittee

John Pugh, Arkansas Fuel Oil Co., Box 94, Shreveport, La., chairman.

*This committee represents the main standardization commit.ee of the Chamber of Mines and Oil, Los Angeles, Calif., which committee, under the chairmanship of C. C. Scharpenberg, is handling all standardization matters for the California and Pacific Coast district in co-operation with the American Petroleum Institute.

The "PRIMM" Drilling Engine



A "PRIMM"

Drilling Engine on Empire Gas and Fuel Company well in the Ozark Mountains of Arkansas.

A BARREL OF FUEL OIL PER 24 HOURS!

That's the usual amount required by the "PRIMM" Oil Well Drilling Engine. This economy over steam or electricity, the exceptional strength and massiveness of all parts, the dependability of operation, the very small amount of water required for cooling purposes, the ease of control of speed and of the special "PRIMM" Reverse Clutch from the derrick—all combined—make the "PRIMM" Drilling Engine the acknowledged superior of any other drilling power unit.

Also built for all kinds of pumping and industrial uses.

Ask for Our Bulletins.

THE POWER MANUFACTURING COMPANY

Factory: Marion, Ohio

Oil Field Branches—Dallas and Tulsa

Distributors: Republic Supply Co. and D. F. Connolly Agency, Inc.

"MORE THAN A QUARTER CENTURY IN THE OIL FIELDS"

E. V. Zagst, 229 East Hillsboro Street, El Dorado, Ark., secretary.

Members

Joseph Daugherty, El Dorado, Ark.

Rocky Mountain District Subcommittee

(Wyoming, Montana and Colorado)

A. W. Peake, Midwest Refining Co., Casper, Wyo., chairman.

William Holland, Ohio Oil Co., Casper, Wyo., vice chairman on wooden derricks.

H. W. Ladd, Midwest Refining Co., Casper, Wyo., vice chairman on steel derricks.

Members

E. H. Besse, E. T. Williams Oil Co., Casper, Wyo.

W. L. Connelly, Mammoth Oil Co., Casper, Wyo.

M. J. Foley, Continental Oil Co., Casper, Wyo.

J. W. Jordan, Sinclair Wyoming Oil Co., Casper, Wyo.

R. B. Leggett, Texas Production Co., Casper, Wyo.

R. W. Loucks, Carter Oil Co., Casper, Wyo.

John McFayden, Ohio Oil Co., Casper, Wyo.

C. G. McCoy, Prairie Oil & Gas Co., Casper, Wyo.

C. H. Sherman, Union Oil Co., Fort Collins, Colo.

R. E. Wertz, Producers & Refiners Corp., Parco, Wyo.

***California District Subcommittee**

J. J. Hern, Chanslor-Canfield Midway Oil Co., Los Angeles, Calif., chairman.

Members

H. H. Anderson, Shell Co. of California, Los Angeles, Calif.

T. A. Collins, Pan American Petroleum & Transport Co., Los Angeles, Calif.

S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif.

F. F. Hill, Union Oil Co. of California, Los Angeles, Calif.

W. F. Huff, California National Supply Co., Los Angeles, Calif.

J. A. Jones, Associated Oil Co., Los Angeles, Calif.

Lester Keim, Oil Well Supply Co., Los Angeles, Calif.

R. L. Rehart, California Rig Builders, Los Angeles, Calif.

C. C. Scharpenberg, Standard Oil Co. of California, Bakersfield, Calif.

Edward Timbs, Union Tool Co., Torrance, Calif.

W. B. Tobin, International Derrick & Equipment Co., Los Angeles, Calif.

Charles Wagner, Emsco Derrick & Equipment Co., Los Angeles, Calif.

Engineering Subcommittee

R. G. Hamaker, Humble Oil & Refining Co., Houston, Tex., chairman.

Members

H. H. Anderson, Shell Co. of California, Los Angeles, Calif.

Glenver McConnell, Roxana Petroleum Corp., Tulsa, Okla.

L. A. Ogden, The Empire Cos., Bartlesville, Okla.

F. O. Prior, Midwest Refining Co., Casper, Wyo.

E. B. Smith, Marion Machine, Foundry & Supply Co., Marion, Ind.

C. D. Watson, Carter Oil Co., Tulsa, Okla.

Steel Derrick Manufacturers' Subcommittee

Harry M. Runkle, International Derrick & Equipment Co., Columbus, Ohio, chairman.

J. D. McEwen, Lee C. Moore & Co., Inc., Pittsburgh, Pa., secretary.

Members

F. D. Bearly, McGraw, Baughman, Bearly Lumber Co., Tulsa, Okla.

F. A. Funk, American Steel Derrick Co., Tulsa, Okla.

Robert A. Marble, Carnegie Steel Co., Pittsburgh, Pa.

J. D. McEwen, Lee C. Moore & Co., Inc., Pittsburgh, Pa.

*This committee represents the main standardization committee of the Chamber of Mines and Oil, Los Angeles, Calif., which committee, under the chairmanship of C. C. Scharpenberg, is handling all standardization matters for the California and Pacific Coast district in co-operation with the American Petroleum Institute.

R. L. O'Brien, Rig Equipment Co., 1528 South St. Louis Street, Tulsa, Okla.

William Schwemlein, Parkersburg Rig & Reel Co., Parkersburg, W. Va.

Guy P. Slater, P. O. Box 36, Sand Springs, Okla.

E. B. Smith, Marion Machine, Foundry & Supply Co., Marion, Ind.

W. A. Trout, Emsco Steel Products Co., 7111 South Alameda Street, Los Angeles, Calif.

D. D. Wertzberger, Wertzberger Derrick Co., Tulsa, Okla.

E. L. Whitney, E. W. Whitney Co., P. O. Box 1694, Tulsa, Okla.

Deck Wilmoth, National Turnbuckle Derrick Co., 415 Wright Building, Tulsa, Okla.

OIL COUNTRY TUBULAR GOODS

Members of the special committee of the American Petroleum Institute on the standardization of specifications for steel and iron pipe for oil country tubular goods are:

J. Edgar Pew, Sun Oil Co., Dallas, Tex., national chairman.

Capt. J. F. Lucey, 1405 Magnolia Building, Dallas, Tex., national vice chairman.

Charles Fitzgerald, Pure Oil Pipe Line Co., Dallas, Tex., national secretary.

Main Committee

P. R. Applegate, N. Y. Transit Co., 26 Broadway, New York City.

B. E. Byrne, National Supply Co., Union National Bank Building, Pittsburgh, Pa.

F. L. Chase, Lone Star Gas Co., Dallas, Tex.

C. H. Clarke, Wichita Falls, Tex.

C. K. Clarke, Standard Oil Co. of Louisiana, Shreveport, La.

C. P. Clayton, P. O. Box 337, Hutchinson, Kans.

Frank Cullinan, American Exchange National Bank Building, Dallas, Tex.

F. V. Faulkner, Magnolia Petroleum Co., Box 1667, Dallas, Tex.

W. W. Fleming, Mid-Kansas Oil & Gas Co., Tulsa, Okla.

W. W. Fondren, Humble Oil & Refining Co., Houston, Tex.

John B. Hofmeier, First National Bank Bldg., Fort Worth, Tex.

G. H. Jacques, Midwest Refining Co., Casper, Wyo.

Glen Kahle, Kirby Building, Dallas, Tex.

E. C. Kinkade, Gulf Pipe Line Co., Houston, Tex.

J. C. McCue, The Texas Company, Houston, Tex.

H. H. Maddren, 338 North Berendo Street, Los Angeles, Calif.

H. J. Morlang, Oil Well Supply Co., Box 1568, Fort Worth, Tex.

J. R. Penn, Texas Pacific Coal & Oil Co., Fort Worth, Tex.

A. D. Sanderson, Standard Oil Co. of New Jersey, P. O. Box 37, Elizabeth, N. J.

John H. Tucker, Gulf Production Co., Houston, Tex.

Eastern District Subcommittee

John B. Tonkin, Peoples Natural Gas Co., Pittsburgh, Pa., chairman.

Members

L. W. Young, South Penn Oil Co., Box 1255, Pittsburgh, Pa.

Mid-Continent District Subcommittee

(Oklahoma and Kansas)

C. D. Watson, Carter Oil Co., Tulsa, Okla., chairman.

Members

M. T. Archer, National Supply Co., Toledo, Ohio.

J. A. Campbell, 204 Central National Bank Bldg., Tulsa, Okla.

J. J. Conry, Carter Oil Co., Tulsa, Okla.

O. T. Dawson, National Supply Co., Box 213, Tulsa, Okla.

H. R. Gruber, Black Steel & Wire Co., 538 Kennedy Bldg., Tulsa, Okla.

John B. Means, Humphreys Petroleum Co., Tulsa, Okla.

W. H. O'Connor, Marland Refining Co., Ponca City, Okla.

Texas District Subcommittee

A. B. Steen, chief engineer, The Texas Company, Houston, Tex., chairman.†

Members

Charles Fitzgerald, Pure Oil Pipe Line Co., Dallas, Tex.

Ben Taylor, Peden Iron & Steel Co., Houston, Tex.

W. A. Moncrief, Marland Oil Co., Fort Worth, Tex.

Louisiana and Arkansas District Subcommittee

Joseph B. Elam, 724 Giddens-Lane Bldg., Shreveport, La., chairman.

Members

George Belchic, Box 1135, Shreveport, La.

J. W. Clark, 502 Merchants Building, Shreveport, La.

J. R. Crawford, 618 City Bank Building, Shreveport, La.

E. L. Woodley, 1018 Merchants Building, Shreveport, La.

Rocky Mountain District Subcommittee

(Wyoming, Montana and Colorado)

N. S. Wilson, Midwest Refining Co., Box 240, Denver, Colo., chairman.

Members

H. L. Havice, Kasoming Oil Co., Cheyenne, Wyo.

S. H. Keoughan, Mutual Oil Co., Patterson Bldg., Denver, Colo.

R. W. Loucks, Carter Oil Co., Box 1130, Casper, Wyo.

John McFayden, Ohio Oil Co., Casper, Wyo.

M. T. Rathvon, Western States Oil & Land Co., Casper, Wyo.

R. S. Shannon, Continental Oil Producing Co., Continental Oil Bldg., Denver, Colo.

R. E. Wertz, Producers & Refiners Corp., Parco, Wyo.

Thos. W. White, Sinclair Consolidated Oil Corp., 45 Nassau St., New York City.

California District

*Main Standardization Committee of the Chamber of Mines and Oils

C. C. Scharpenberg, Standard Oil Co. of Calif., Bakersfield, Calif., chairman.

W. L. McLaine, General Petroleum Corp. of California, Los Angeles, Calif., first vice chairman.

Edwin Higgins, Chamber of Mines and Oil, Los Angeles, California, secretary.

Members (Operators)

H. H. Anderson, Shell Co. of California, Los Angeles, Calif.

Wallace Canfield, Pacific Oil Co., San Francisco, Calif.

T. A. Collins, Pan American Petroleum Corp. of Calif., Los Angeles, Calif.

T. J. Crumpton, California Petroleum Corp. of California, Los Angeles, Calif.

S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif.

L. C. Hampton, Union Oil Co. of California, Los Angeles, Calif.

J. J. Hern, Chanslor-Canfield Midway Oil Co., Los Angeles, Calif.

F. F. Hill, Union Oil Co. of California, Los Angeles, Calif.

J. A. Jones, Associated Oil Co., Los Angeles, Calif.

W. M. Keck, Superior Oil Co., Los Angeles, Calif.

R. R. Pollock, Box 159, Maricopa, Calif.

Ralph J. Reed, Union Oil Co. of California, Los Angeles, Calif.

W. M. Smith, Miley Oil Co., 1104 Pacific Mutual Bldg., Los Angeles, Calif.

W. C. Wickersham, Belridge Oil Co., Los Angeles, Calif.

Arthur Wickstram, United Oil Co., Los Angeles, Calif.

(Manufacturers)

A. J. Carr, American Seamless Tube Corp., Los Angeles, Calif.

E. W. Goeser, Emsco Derrick & Equipment Co., 6811 S. Alameda St., Los Angeles, Calif.

Lester Keim, Oil Well Supply Co., Los Angeles, Calif.

Edward Timbs, Union Tool Co., Torrance, Calif.

William A. Trout, Emsco Steel Products Co., Los Angeles, Calif.

(Continued on Page 366)

†Deceased.

*This committee acts on all matters relating to standardization of oil country tubular goods for the California district.

Proper Adjustment of Materials to Requirements—Standardization

By A. C. M'LAUGHLIN
Vice President, Associated Oil Co.

Having received a copy of the A. P. I. handbook covering standardization of oil well materials, I wish to contribute my share of appreciation to the men who have accomplished this most important contribution to the oil industry.

Standardization is the proper adjustment of materials to requirements. From this it follows that to properly standardize materials, we should know accurately what is required and in addition thereto, we should know accurately what can be made to meet that requirement. The American Petroleum Institute had the foresight to appreciate the fact that within the institute's membership we have the manufacturer and the consumer, the two factors which must be brought together to effect a proper standardization. It also appreciated the fact that in order to bring these two factors together, it was necessary to introduce a third factor which, in this case, was J. Edgar Pew. That the institute was right is amply shown by the results of the remarkable work done by the various committees and recorded in the handbook.

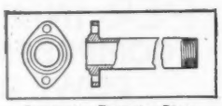
The one danger of standardization, as I see it, is the fact that its tendency is to fix products or materials, whereas the requirements of the industry with respect to such products are constantly varying. I visualize a proper standardization as a row of billiard balls, to one end of which is constantly being added a ball, resulting in the ejection from the row of a corresponding ball at the other end. In other words, it is my thought that the work of the standardization committee of the institute has only just begun as it will be necessary for it to constantly change its standards to meet changing requirements if this work is to be fully effective in accomplishing the results intended.

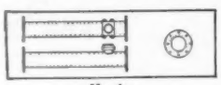
May I offer my sincere congratulations to the institute for the very fine piece of work that has been accomplished and which I feel will be continued with untold benefits to the industry.

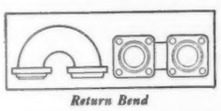
STERLING

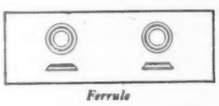
New and re-designed STERLING OIL PRODUCTS

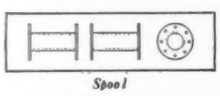
THE following new and re-designed STERLING Oil Products—made of corrosion-resisting ARCO Metal—and developed to meet changes in distillation practice necessitating higher pressures and temperatures—are of utmost importance to every refinery engineer in laying out new work.

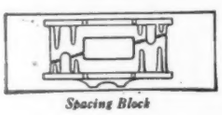

Companion Extension Pieces

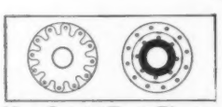

Header


Return Bend

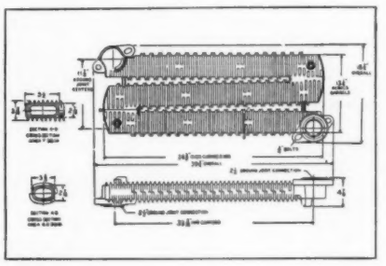

Ferrule


Spool

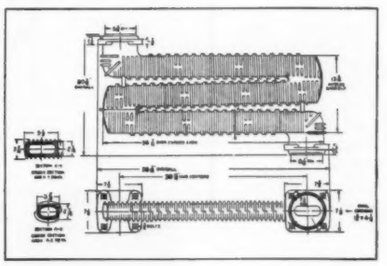

Spacing Block


New Special Tank Flange for riveting to condenser box and connecting up to spool from condenser or cooling coil.

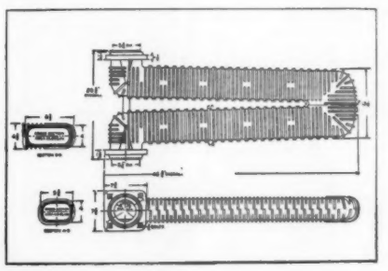
New 14 ft. Condensing Section, with Ground Joint Connection, including Ground Joint Flanges, Extension Pieces, Headers and Flanged Tees, also two new Headers—13⅛″ and 25″ in length.



New 14 ft. Cooling Section, tongue and groove, with 4-bolt connection, including Companion Flanges, Return Bends, Elbows and Spacing Blocks.



Re-designed Cooling Section, with 20 sq. ft of surface (formerly 19½ ft. Section), giving greater wrench clearance when assembling.



All these new products are in stock at our new foundry at Springfield, Illinois, ready for immediate shipment. ***Write for new detailed measurements before laying out new work.***

AMERICAN RADIATOR COMPANY

Industrial Division No. A

Factory: Springfield, Ill.

40 West 40th Street NEW YORK | 816 South Michigan Avenue CHICAGO | 935 Kennedy Bldg. TULSA | 1214 Quinby Bldg. LOS ANGELES

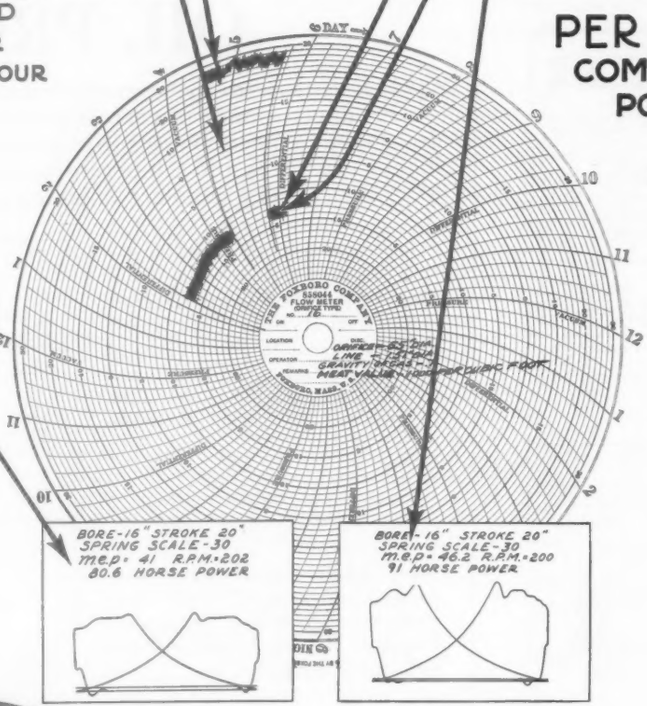
Scientifically test

THE OLD WAY

DIFFERENTIAL = 19 INCHES
DOWN STREAM STATIC = 4 OZ
FLOW RATE = 1170 FEET PER HOUR
80.6 INDICATED COMPRESSOR HORSE POWER
FUEL RATE = 14.5 CUBIC FEET PER INDICATED COMPRESSOR HORSE POWER HOUR

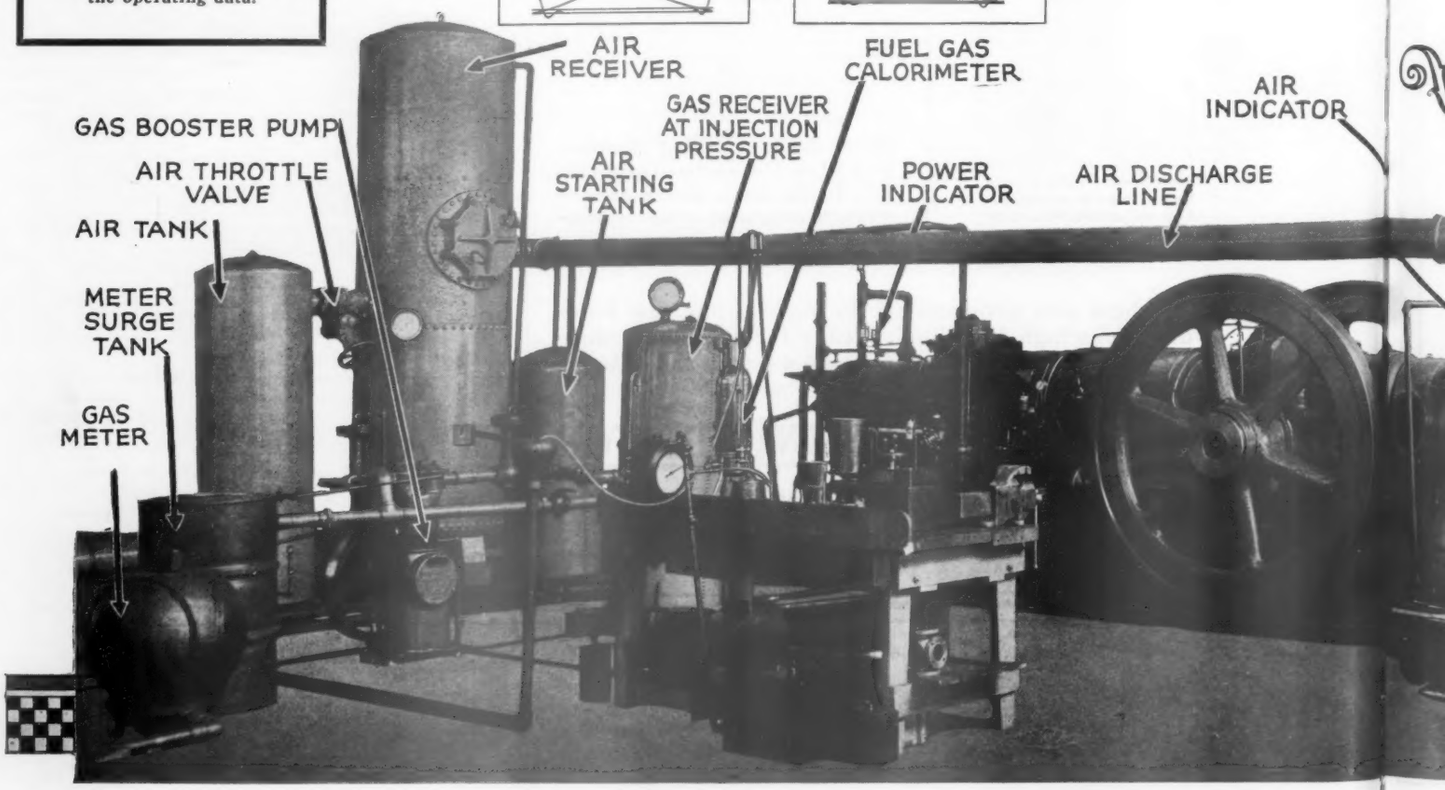
THE SUPER CLARK

DIFFERENTIAL = 6.25 INCHES
DOWN STREAM STATIC = 13.0 POUNDS
FLOW RATE = 948 FEET PER HOUR
91.0 INDICATED COMPRESSOR HORSE POWER
FUEL RATE = 10.4 FEET PER INDICATED COMPRESSOR HORSE POWER HOUR NOT PER BRAKE HORSE POWER HOUR



The above chart shows the results of exhaustive experimental tests conducted with the Clark Super "2" Cycle Compressor using the Clark Fuel Injector. It can readily be seen how pronounced is the fuel saving with this new device over the old type compressor, and how much smoother is the operation of this compressor,—with increased horse power.

The view below shows the scientific testing apparatus which was used to record the operating data.

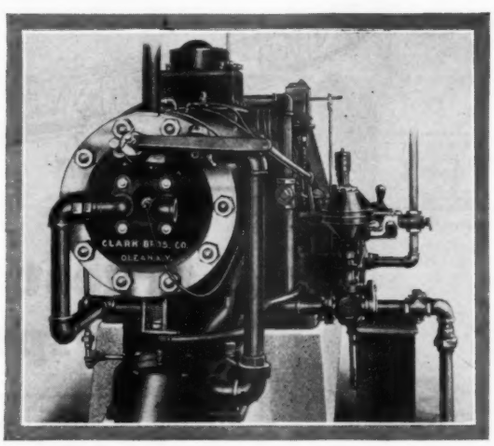


sted for 12 months

For more than a year we tested the CLARK FUEL INJECTOR with the CLARK SUPER "2" at our Olean factory. The results (opposite) show the greater fuel economy and smoother operation of this compressor.

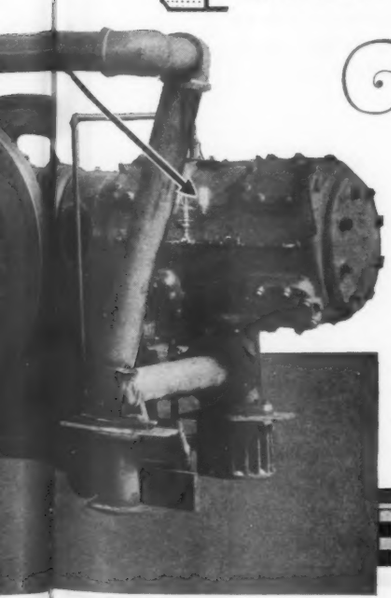
A glance at the test set-up of the Clark Super "2" Compressor, opposite, is sufficient to suggest the thoroughness with which the Clark Fuel Injector was tested for operating facts. For more than a year this compressor was operated at our Olean plant, with the most scientific apparatus available, until our engineers were convinced of the perfection of this fuel saving device for obtaining greater fuel economy and smoother operation from the Clark Super "2" cycle compressor.

See the Super "2" at the Exposition, where it will be shown in connection with other Clark products. Several have been installed for leading gasoline manufacturers, where their remarkable fuel economy and consistently better performance have already marked them for further popularity. Clark Bros. Co., Olean, New York. Branch and Mid-Continent warehouse at 125 W. First St., Tulsa, Okla. Warehouses at McCamey and Sweetwater, Texas,



and Artesia, N. M. Also Smith, Booth, Usher Co., 228 S. Central Ave., Los Angeles and 50 Fremont St., San Francisco.

The CLARK exhibit at the Petroleum Exposition offers an opportunity to study at first hand the following CLARK products:



CLARK
COMPRESSORS
DRILLING ENGINES
PUMPING ENGINES

'BE SURE TO SEE THEM'

Clark Bros. Co. OLEAN, N.Y.

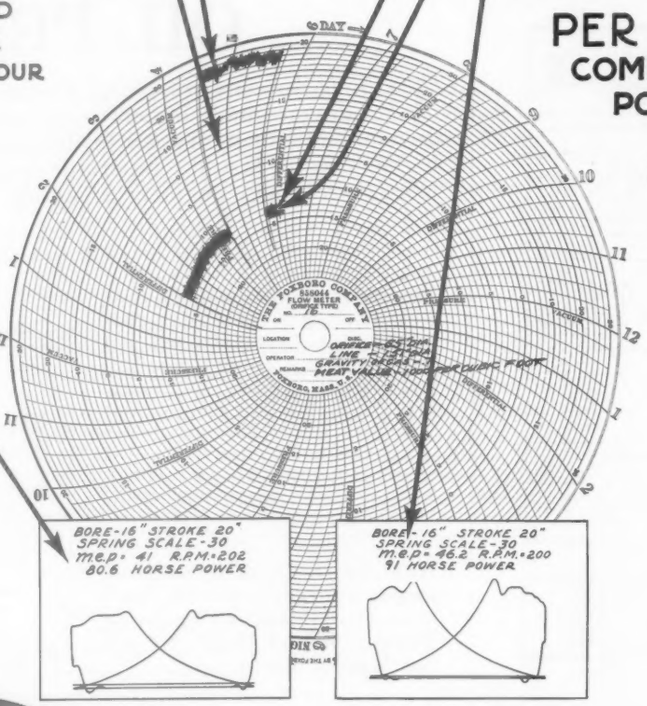
Scientifically test

THE OLD WAY

DIFFERENTIAL = 19 INCHES
DOWN STREAM STATIC = 4 OZ
FLOW RATE = 1170 FEET PER HOUR
80.6 INDICATED COMPRESSOR HORSE POWER
FUEL RATE = 14.5 CUBIC FEET PER INDICATED COMPRESSOR HORSE POWER HOUR

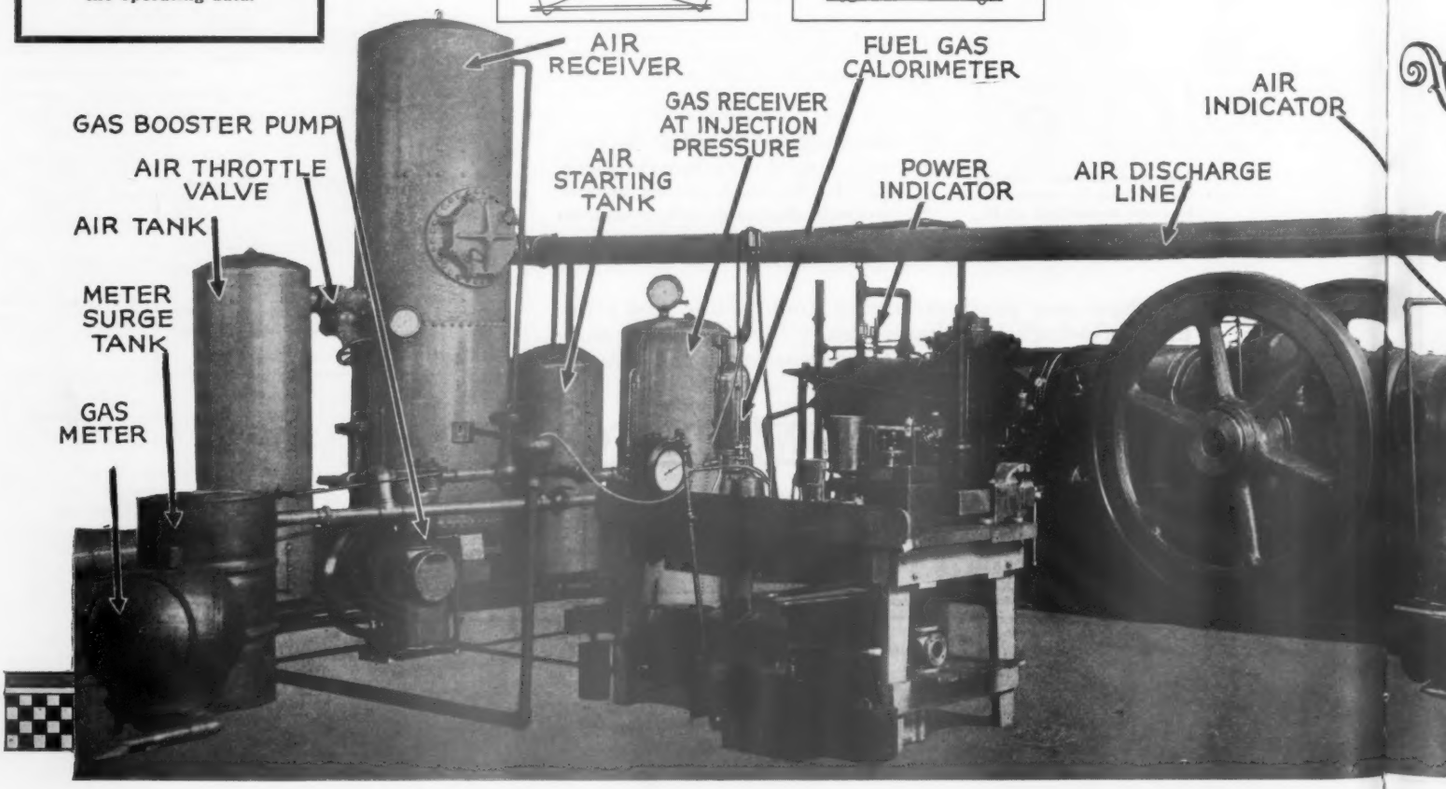
THE SUPER CLARK

DIFFERENTIAL = 6.25 INCHES
DOWN STREAM STATIC = 13.0 POUNDS
FLOW RATE = 948 FEET PER HOUR
91.0 INDICATED COMPRESSOR HORSE POWER
FUEL RATE = 10.4 FEET PER INDICATED COMPRESSOR HORSE POWER HOUR NOT PER BRAKE HORSE POWER HOUR



The above chart shows the results of exhaustive experimental tests conducted with the Clark Super "2" Cycle Compressor using the Clark Fuel Injector. It can readily be seen how pronounced is the fuel saving with this new device over the old type compressor, and how much smoother is the operation of this compressor,—with increased horse power.

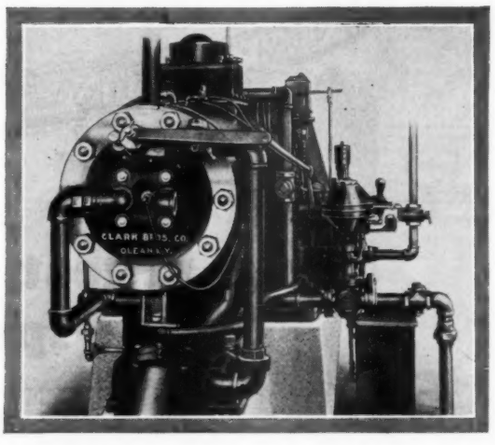
The view below shows the scientific testing apparatus which was used to record the operating data.



sted for 12 months

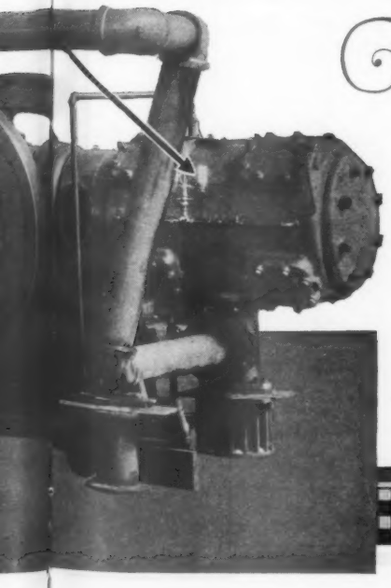
For more than a year we tested the CLARK FUEL INJECTOR with the CLARK SUPER "2" at our Olean factory. The results (opposite) show the greater fuel economy and smoother operation of this compressor.

A glance at the test set-up of the Clark Super "2" Compressor, opposite, is sufficient to suggest the thoroughness with which the Clark Fuel Injector was tested for operating facts. For more than a year this compressor was operated at our Olean plant, with the most scientific apparatus available, until our engineers were convinced of the perfection of this fuel saving device for obtaining greater fuel economy and smoother operation from the Clark Super "2" cycle compressor.



See the Super "2" at the Exposition, where it will be shown in connection with other Clark products. Several have been installed for leading gasoline manufacturers, where their remarkable fuel economy and consistently better performance have already marked them for further popularity. Clark Bros. Co., Olean, New York. Branch and Mid-Continent warehouse at 125 W. First St., Tulsa, Okla. Warehouses at McCamey and Sweetwater, Texas, and Artesia, N. M. Also Smith, Booth, Usher Co., 228 S. Central Ave., Los Angeles and 50 Fremont St., San Francisco.

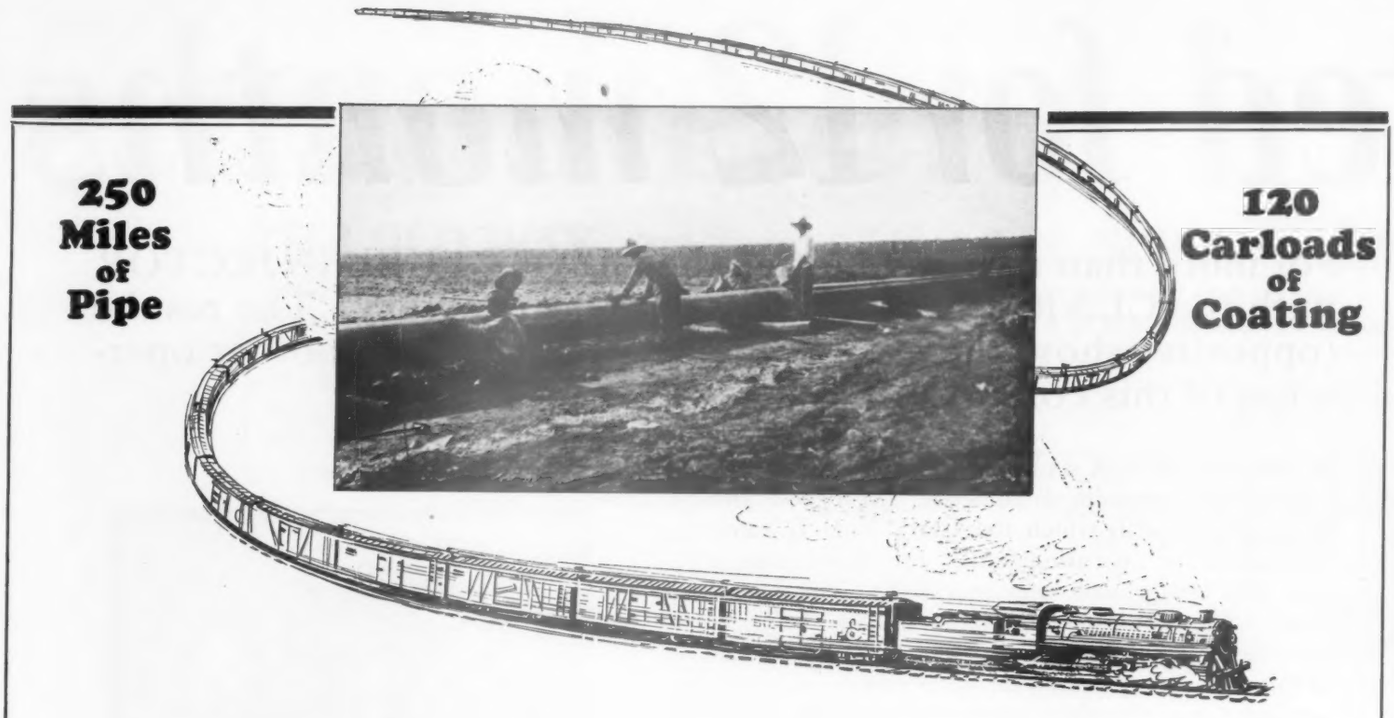
The CLARK exhibit at the Petroleum Exposition offers an opportunity to study at first hand the following CLARK products:



CLARK
COMPRESSORS
DRILLING ENGINES
PUMPING ENGINES

'BE SURE TO SEE THEM'

Clark Bros. Co. OLEAN, N.Y.



The Largest Order Ever Placed for Pipe Line Coating

ONE HUNDRED AND TWENTY carloads of BITUMASTIC ENAMEL—each carload weighing 40,000 lbs.—have been ordered to protect the 250 miles of 20″ steel pipe now being laid by the Empire Gas and Fuel Company, a subsidiary of the Cities Service Company. Extending from the Texas Panhandle to Wichita Kan., this line is one of the largest natural gas conveyors in the world and its protection calls for the largest order of pipe coating material ever placed with a single concern.

It is natural that BITUMASTIC ENAMEL should be selected for this purpose as the engineers in charge conducted an exhaustive study of all available materials and could find no other coating with a comparable record for longevity. It is the coating which was used to protect 85 miles of the Interstate Line running between Monroe and Baton Rouge, La. It is the coating used to protect 170 miles of the Shell Oil Company's Valley Pipe Line which is still in excellent condition after more than twelve years' burial in highly corrosive soil. It is the coating which is also used extensively on water mains, marine structures and ships. For more than forty years in these various fields, it has been establishing world's records in the anti-corrosive protection of steel.

There is no substitute for experience. Other coatings *may* live as long but no other *has*. Engineers, responsible for preservation of these lines have, therefore, pinned their faith to the forty year performance of—

BITUMASTIC
Reg. U. S. Pat. Off.
ENAMEL

Write for our complete book—
"The Protection of Pipe Lines"

WAILES DOVE-HERMISTON CORPORATION
17 Battery Place, New York
1 North Frankfort St., Tulsa

Philadelphia **Cleveland** **Chicago** **San Francisco**

A. P. I. SPECIFICATIONS FOR STANDARD RIG IRONS

(Continued from Page 166)

that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the

R. B. LEGGETT
Rig Irons.

place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

17-b. Where inspector representing the purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

17-c. Material manufactured in accordance with these specifications which proves to be defective subsequent to acceptance at manufacturer's works or

WILLIAM SCHWEMLEIN
Rig Irons.

when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A.P.I. material. When material stamped or marked with the A.P.I. monogram is rejected, such monogram shall be canceled as follows:

17-d. On cast material the loop in the letter "P" shall be chipped off.

17-e. On forged material, a steel canceling stencil, one-half inch square, as shown, shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

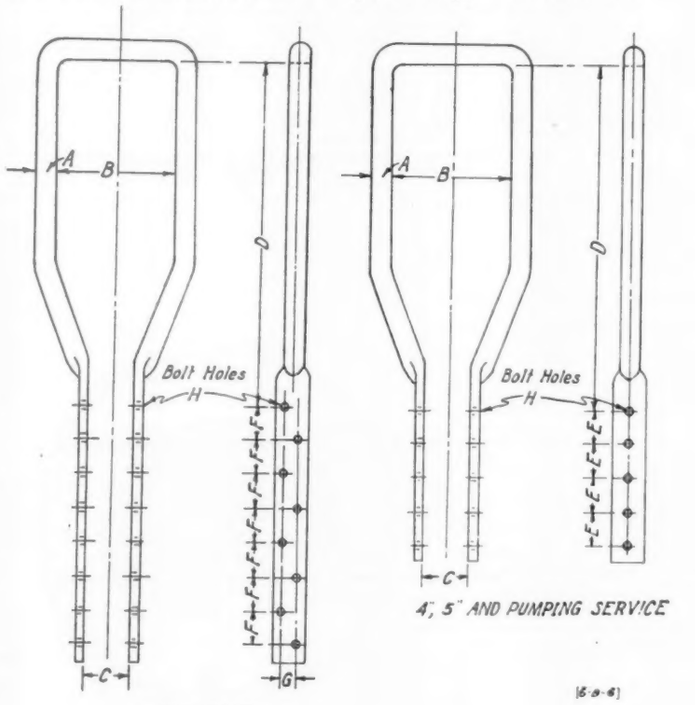


Figure 22—Pitman Stirrups

A.P.I. SPECIFICATIONS TRANSMISSION STANDARDS

(Continued from Page 180)

face is a non-curved (straight) section (V-W) of the flank joining the curved upper and lower flanks of the tooth.

12-c. The flat face (V-W) of the tooth shall be tangent to the lower flank arc (U-V) and normal to the lower side (R'-v) of the pressure angle.

12-d. The flat face of the tooth shall have its origin at the intersection (V) of the lower side of the pressure angle with the lower flank arc, and shall have a length "H" dependent upon the relationship between the permissible chain stretch (Q. V., paragraph 12-f), the number of teeth in the sprocket, and the pres-

This is another of a series on specifications—keep for reference in ordering.

BARSCO PRODUCTS

for Oil and Gas Well Drilling

Rotary Saw Tooth Shoes for rotary system, punched from *forged steel*, not welded. The cutting edges are especially tempered and can be hardened to any specifications. Standard and intermediate sizes.

Size Pipe for, in.	4	4	4	4½	4½	6	6	6¼	6¼	6¼	6⅝
Length, in.	12	14	16	12	16	14	16	12	14	16	12
Weight, pounds	20	25	30	25	30	45	50	40	45	50	30

Size Pipe for, in.	6⅝	6⅝	8¼	8¼	10	10	12½	12½	15⅝	15⅝	20
Length, in.	14	16	14	16	14	16	14	16	14	16	16
Weight, pounds	30	35	60	65	80	85	125	135	160	170	275

Intermediate sizes, also sizes larger or smaller than listed can be furnished.

Note:—Smallest inside measurement is the same as inside diameter of pipe or casing on which shoes are to be used. In ordering, give size, weight, pitch of thread and make of casing on which shoe is to be used and also size and weight of casing through which shoe is to pass.

BARSCO line of casing shoes includes "Bloom Pattern"—"Regular Pattern"—"Baker Pattern." *There's a BARSCO Casing Shoe for every requirement.*

Stocks carried by Dealers.

BARTLESVILLE SUPPLY COMPANY of Missouri
3400 MAURY AVENUE—ST. LOUIS, MISSOURI
Texas Warehouse: J. G. Lockard, 504 Western Ave., Amarillo, Texas
Export Office: 150 Broadway, New York City

Manufacturer's Representatives

B. & A. Specialty Co., Tulsa, Okla.
Miller Tank & Supply Co., Casper, Wyo.

—Write for Complete Catalog

IT PAYS TO BUY GOOD TOOLS

What Billy Beaver Thinks About Standardizing

A good thing—this standardization business—but I guess it falls short of the goal pretty often.

Now they tell me standardization pays big returns—of course that means money returns—because it makes dollars and pennies go farther and cause less fuss in the going. Well, if that's the goal of standardization I guess the folks who buy equipment that pays a big profit by saving time and labor have a big start on the other fellows.

Now take Beaver Die Stocks. They are money makers because they save time and labor. They are self-contained, and so folks don't fritter away minutes hunting for loose parts.

I've put a few Beavers on display here—sorry I couldn't put 'em all out where you could see them—but then I've got a dandy little Booklet—No. 19—that tells all about the whole 26 of 'em. Write me for a copy.

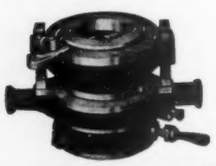
BILLY BEAVER
The Borden Co.
514 Dana Ave., Warren, Ohio

NO. 6 BEAVERETTE
¼ to ¾ Adjustable

Fits your hand—and always ready. Set the dial to size and cut your thread while hunting for die and bushings in other tools. Fully described in Booklet No. 19.

NO. 41 BEAVER
2½ to 4 inch

Another adjustable tool. Set the dial to size and it's ready. Narrow receding dies, power reducing gear and ratchet handle make 4 inch easy threading. No. 61—2½ to 6 inch; No. 80—4½ to 8 inch and No. 90—9 to 12 inch are of same design—and adjustable. All are one man tools.



NO. 26 BEAVER RATCHET
1 to 2 inch adjustable

A dandy tool. The old stand-by wherever oil flows through pipe. Always ready. Set the dial and go ahead. Universal chuck—no loose bushings. A husky tool that's equal to the hard use tools get in the oil fields. Narrow receding dies make 2 inch threading a dead cinch. No. 25 is just like it but does not have the ratchet. No. 19 Booklet tells all about No. 25 and No. 26.

NO. 44 BEAVER
Power Drive

Oil fields are using this handy machine in salvage work. Cuts up to 12 inch; threads up to 6 inch. Makes power machines of any make of hand tools. Powerful, portable, economical and dependable. Attach it to any light socket. Compact and rugged. Safe to use—the pipe revolves the tools stand still. Let No. 19 Booklet tell you all about it.

Can't show the pipe cutter in this booth but if you'll write for No. 19 Booklet you'll learn all about standardizing on Beavers.

Sincerely,
BILLY BEAVER.

BEAVER

Time and Labor Saving Die Stocks, Pipe Cutters and Power Drives

sure angle, as shown by the following formula:

$$H = 0.02(P)(\text{cosec } 180/N)[\text{sec } (180/N + F)]$$

Where
H = length of flat face, inches
P = chain pitch, inches
N = number of teeth in sprocket
F = pressure angle, degrees
cosec = natural cosecant
sec = nat secant

12-e. Table 9 gives lengths of flat face for numbers of teeth from 6 to 50 inclusive, for the three sizes of A.P.I. standard chain.

12-f. The total permissible chain stretch of A.P.I. chains running of A.P.I. sprockets is specified as 4% (four per cent) of the pitch. When chains in service have stretched this amount, they are unfit for further services and should be renewed. The flat-faced tooth is designed to compensate for this amount of stretch in the chain.

Note: The chain stretch above specified has no connection with the manufacturing tolerance on new chains, described in paragraph 5-c.

Upper Tooth Flanks

See Figure 7

13-a. The upper flanks of teeth for A.P.I. standard sprockets shall be formed from arcs of circles.

13-b. The upper flank shall extend upwardly from the upper end (W) of the (straight) flat face to a tangent junction with the arc forming the tooth crest. (Q. V. hereinafter.)

13-c. The arc of the upper flank shall have a radius "G" equal to the pitch "P" for sprockets having 9 (nine) teeth or less.

13-d. The arc of the upper flank shall have a radius "G" equal to one-half the pitch "P" for sprockets having 16 (sixteen) or more teeth.

13-e. For sprockets having 10 to 15 teeth, inclusive, the radius "G" shall have intermediate values, as shown in Table 13.

13-f. The lower end (W) of the upper flank arc shall have origin at the upper limit of the flat face and shall be tangent thereto.

13-g. The center (Z) of the upper

W. L. TODD
Rotary Drilling Equipment.

flank arc shall be located on a line (W-Z) normal to the flat face (and therefore parallel to the lower leg, R'-V, of the pressure angle ("F", which normal to the flat face shall have origin at the upper end (W) of the flat face.

Note: The adjacent upper flank of the same tooth has origin at W' with center Z located on the normal W'-Z drawn from the upper limit of flat face V'-W', and has radius "G".

Tooth Crest

See Figure 7

14-a. The crests of A.P.I. standard

TABLE 6
TOOTH OUTLINE FOR A.P.I. STANDARD SPROCKETS
See Figure 6. All Dimensions in Inches

A.P.I. Chain No.	Width of Tooth Crest "M"	Radius of Outline Arc "Q"	Width of Tooth Base "K"	Width of Roller "B"
3	0.559	1.391	1.328	1-7/16
3½	0.453	1.478	1.328	1-7/16
4	0.716	1.716	1.732	1-7/8

TABLE 7
CONSTANTS FOR DETERMINING PITCH DIAMETER
From D=(P) (Cosec 180/N)
See Figure 7

No. of Teeth	Cosec 180/N	No. of Teeth	Cosec 180/N	No. of Teeth	Cosec 180/N
6	2.0000	21	6.7095	36	11.4737
7	2.3048	22	7.0267	37	11.7918
8	2.6131	23	7.3441	38	12.1099
9	2.9238	24	7.6613	39	12.4281
10	3.2360	25	7.9787	40	12.7455
11	3.5496	26	8.2963	41	13.0640
12	3.8637	27	8.6138	42	13.3820
13	4.1787	28	8.9318	43	13.6999
14	4.4940	29	9.2494	44	14.0179
15	4.8097	30	9.5667	45	14.3355
16	5.1258	31	9.8845	46	14.6539
17	5.4422	32	10.2023	47	14.9722
18	5.7588	33	10.5205	48	15.2898
19	6.0755	34	10.8383	49	15.6087
20	6.3924	35	11.1559	50	15.9260

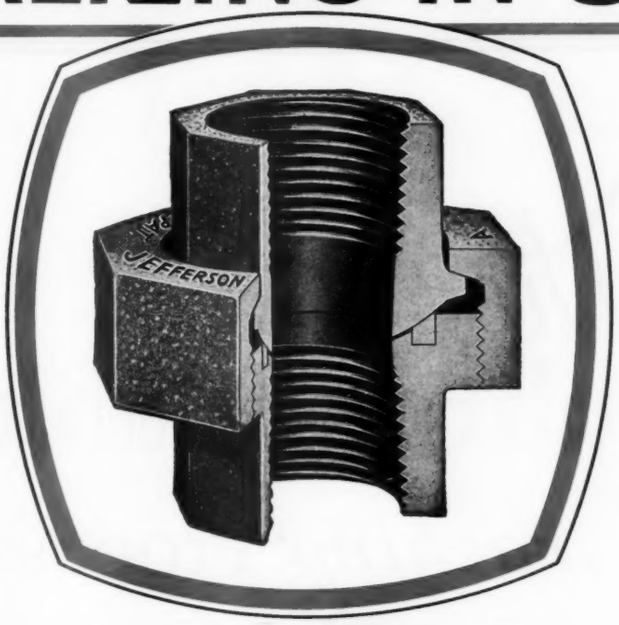
TABLE 8
PITCH LINE CLEARANCE FOR A.P.I. STANDARD CAST SPROCKETS
See Figure 7. All Dimensions in Inches

Number of Teeth	A.P.I. Chain No. 3 "L"	A.P.I. Chain No. 3½ "L"	A.P.I. Chain No. 4 "L"
14 teeth or less	0.092	0.105	0.122
15 to 24	0.123	0.140	0.163
25 and up	0.154	0.175	0.203

TABLE 9
LENGTHS OF FLAT TOOTH FACE FOR A.P.I. STANDARD SPROCKETS
See Figure 7
All dimensions in inches

Number of Teeth	Values of "H" A.P.I. chain No. 3	A.P.I. chain No. 3½	A.P.I. chain No. 4	Number of Teeth	Values of "H" A.P.I. chain No. 3	A.P.I. chain No. 3½	A.P.I. chain No. 4
6	.160	.180	.210	29	.650	.750	.860
7	.180	.200	.230	30	.670	.770	.880
8	.200	.220	.255	31	.690	.800	.910
9	.220	.240	.280	32	.710	.820	.940
10	.240	.260	.300	33	.730	.850	.970
11	.260	.290	.330	34	.750	.870	1.000
12	.280	.310	.360	35	.780	.900	1.030
13	.300	.340	.390	36	.810	.920	1.060
14	.320	.360	.420	37	.830	.950	1.090
15	.340	.390	.450	38	.850	.970	1.120
16	.360	.410	.480	39	.870	1.000	1.150
17	.380	.440	.510	40	.890	1.030	1.180
18	.400	.460	.540	41	.910	1.050	1.210
19	.420	.490	.570	42	.930	1.080	1.240
20	.440	.510	.600	43	.950	1.100	1.270
21	.460	.540	.630	44	.970	1.120	1.300
22	.490	.560	.660	45	1.000	1.160	1.330
23	.510	.590	.690	46	1.020	1.180	1.360
24	.530	.610	.710	47	1.040	1.210	1.395
25	.560	.640	.740	48	1.070	1.240	1.420
26	.590	.670	.770	49	1.090	1.260	1.450
27	.610	.700	.800	50	1.110	1.290	1.480
28	.630	.720	.830				

-SPECIALIZING IN UNIONS-



Jefferson Unions are DURABLE!

Jefferson Unions add *long life* to their advantages of tightness and ease of application. For, by specialized research, we have developed the most durable materials as well as superior design and methods of manufacture.

Jefferson Unions and Flanges are made of the best grade of brass and air-refined malleable iron, and nut threads are heavily coated with graphite for added resistance to corrosion. Jefferson Unions endure through long service. They are easily disconnected at any time.

Jefferson ground ball, brass-to-iron joints are leak-proof. Liberal play between nut and swivel end promotes ease of application. Made in all types and sizes for every oil industry need.

JEFFERSON UNION COMPANY
Lexington, Mass., U. S. A.
Handled by All Leading Oil Industry Jobbers

JEFFERSON

The Holmes-Manley *Cracking* Process

Flexibility of Operation.

High Yield of Quality Gasoline direct from the Unit.

Fractionation and Condensation under Full Operating Pressure.

High Yield of Liquid Products with a minimum yield of fixed gas and carbon.

Low yield of Residue Fuel Oil of good Quality.

Relatively low Operating Temperatures.

Ease of Control.

Long Runs and High percentage of Operating Time.

Low Labor and Fuel Costs.

Address Inquiries to

THE TEXAS COMPANY

W. S. S. RODGERS

17 Battery Place, New York, N. Y.

Branch Office

816 Palace Building, Tulsa, Okla.

cast sprockets shall be formed from arcs of circles.

14-b. The crests of A.P.I. standard cut sprocket teeth may be flat.

14-c. The crest of the tooth for cast sprocket teeth shall be a circular arc with a radius of three-sixteenths inch for all sizes of A.P.I. standard sprockets. This arc shall join accurately (be tangent to) the arcs forming the upper flanks of the tooth.

Note: The center of the 3/16-inch arc depends upon the various functions governing the design and is found most conveniently by trial, using graphical methods. Necessarily it lies on a diametral center line through the center of the tooth crest.

Outside Diameter

See Figure 7

15-a. The outside diameter of A.P.I. standard sprockets is the diameter of that circle (the "outside circle") which is tangent to the tops or crests of the teeth.

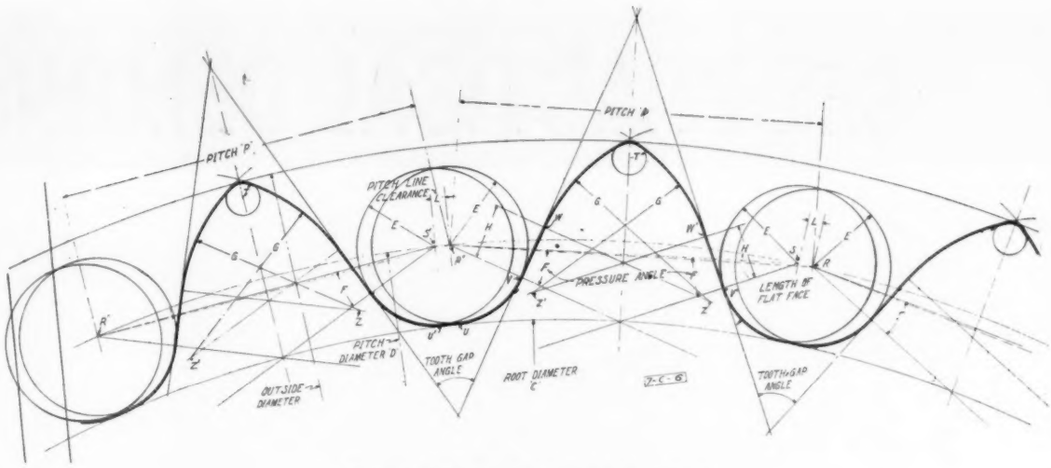


Figure 7—A.P.I. Standard Sprocket Tooth Profile.

TABLE 10
VALUES OF PRESSURE ANGLE "F" FOR A.P.I. STANDARD SPROCKETS

See Figure 7
F=30—180/N

Number of Teeth	Value of "F" Degrees	Number of Teeth	Value of "F" Degrees
6	10.0	29	23.8
7	10.0	30	24.0
8	10.0	31	24.2
9	10.0	32	24.4
10	12.0	33	24.55
11	13.7	34	24.7
12	15.0	35	24.86
13	15.4	36	25.0
14	17.1	37	25.13
15	18.0	38	25.27
16	18.75	39	25.4
17	19.4	40	25.5
18	20.0	41	25.6
19	20.5	42	25.7
20	21.0	43	25.8
21	21.4	44	25.9
22	21.8	45	26.0
23	22.2	46	26.1
24	22.5	47	26.2
25	22.8	48	26.3
26	23.0	49	26.33
27	23.3	50	26.4
28	23.6	..	..

TABLE 17
A.P.I. STANDARD CHAIN AND SPROCKET DEFINITIONS AND FORMULAS

See Figure 6 and Figure 7

A=Roller diameter. See Table 4.
B=Roller width. See Table 4.
C=Root diameter=D—(1.005) (A)—0.003.
D=Pitch diameter=(P) (cosec 180/N).
E=Radius lower flank=(1.005) (A)/2+0.0015.
F=Pressure angle. See table below for 6 to 11 teeth, inclusive; for 12 and more teeth, use formula F=30—180/N.
G=Radius upper flank, equal to "P" for 9 teeth or less, and equal to P/2 for 16 teeth and more, and having corresponding intermediate values shown in Table 13 for 10 to 15 teeth.
H=Length of flat face=0.02 (P) (cosec 180/N) [sec. (180/N+F)].
L=Pitch line clearance, equal to (0.03) (P) for 14 teeth or less, to (0.04) (P) for 15 to 24 teeth, and equal to (0.05) (P) for 25 teeth and more.
M=Width of tooth crest (outline)=K—P/4.
K=Width of tooth base (outline)= (0.924) (B).

(Continued on Page 245)

TABLE 11
PITCH DIAMETERS FOR A.P.I. STANDARD SPROCKETS

See Figure 7. See Table 7 for values of "Cosec. 180/N"
D=(P) (O) Where "O"=Cosec. 180/N

Number of Teeth	Values of "D" A.P.I. No. 3	A.P.I. No. 3½	A.P.I. No. 4	Number of Teeth	Values of "D" A.P.I. No. 3	A.P.I. No. 3½	A.P.I. No. 4
6	6.150	7.000	8.126	29	28.442	32.373	37.580
7	7.087	8.067	9.364	30	29.418	33.483	38.870
8	8.035	9.146	10.617	31	30.395	34.596	40.161
9	8.991	10.233	11.879	32	31.372	35.708	41.452
10	9.951	11.326	13.148	33	32.351	36.822	42.745
11	10.915	12.424	14.422	34	33.328	37.934	44.036
12	11.881	13.523	15.698	35	34.304	39.046	45.326
13	12.850	14.625	16.978	36	35.282	40.158	46.618
14	13.819	15.729	18.259	37	36.260	41.271	47.910
15	14.790	16.834	19.542	38	37.238	42.385	49.203
16	15.762	17.940	20.826	39	38.216	43.498	50.495
17	16.735	19.048	22.112	40	39.192	44.609	51.785
18	17.708	20.156	23.398	41	40.172	45.724	53.079
19	18.682	21.264	24.685	42	41.150	46.837	54.371
20	19.657	22.373	25.972	43	42.127	47.950	55.663
21	20.632	23.483	27.261	44	43.105	49.063	56.955
22	21.607	24.593	28.549	45	44.082	50.174	58.245
23	22.583	25.704	29.839	46	45.061	51.289	59.539
24	23.558	26.815	31.128	47	46.040	52.403	60.832
25	24.535	27.925	32.417	48	47.016	53.514	62.122
26	25.511	29.037	33.708	49	47.997	54.630	63.418
27	26.487	30.148	34.998	50	48.972	55.741	64.707
28	27.465	31.261	36.290				

TABLE 12
ROOT DIAMETERS FOR A.P.I. STANDARD SPROCKETS
VALUES OF "C"

See Figure 7. All Dimensions in Inches
C=D—X_2 Where X_2=(A) (1.005)+0.003=(2) (E)
For A.P.I. No. 3, X_2=1.259
For A.P.I. No. 3½, X_2=1.636
For A.P.I. No. 4, X_2=1.762

Number of Teeth	Values of "C" A.P.I. No. 3	A.P.I. No. 3½	A.P.I. No. 4	Number of Teeth	Values of "C" A.P.I. No. 3	A.P.I. No. 3½	A.P.I. No. 4
6	4.891	5.374	6.364	27	25.288	28.512	33.236
7	5.828	6.431	7.602	28	26.206	29.625	34.528
8	6.776	7.510	8.755	29	27.183	30.737	35.818
9	7.732	8.597	10.117	30	28.159	31.847	37.108
10	8.692	9.690	11.386	31	29.136	32.960	38.399
11	9.656	10.788	12.660	32	30.113	34.072	39.690
12	10.622	11.887	13.936	33	31.092	35.186	40.983
13	11.591	12.989	15.216	34	32.069	36.298	42.274
14	12.560	14.093	16.497	35	33.045	37.410	43.564
15	13.531	15.198	17.780	36	34.022	38.522	44.856
16	14.503	16.304	19.064	37	35.001	39.635	46.148
17	15.476	17.412	20.350	38	35.979	40.749	47.441
18	16.449	18.520	21.636	39	36.957	41.862	48.733
19	17.423	19.628	22.923	40	37.933	42.973	50.023
20	18.398	20.737	24.210	41	38.913	44.088	51.317
21	19.373	21.847	25.499	42	39.891	45.201	52.609
22	20.348	22.957	26.787	43	40.868	46.314	53.901
23	21.324	24.068	28.077	44	41.846	47.427	55.193
24	22.299	25.179	29.366	45	42.823	48.538	56.583
25	23.276	26.289	30.655	46	43.802	49.653	57.777
26	24.252	27.401	31.946	47	44.781	50.767	59.070
				48	45.257	51.878	60.360
				49	46.738	52.994	61.656
				50	47.713	54.105	62.945

TABLE 13—A.P.I. STANDARD SPROCKETS

Values of Lower Flank Radius "E" and Upper Flank Radius "G"
See Figure 7.
All Dimensions in Inches.

	A.P.I. No. 3	A.P.I. No. 3½	A.P.I. No. 4
"A"=Roller diameter	1.25	1.625	1.75
X_1=(A) (1.005)	1.256	1.633	1.759
X_2=X_1+0.003	1.259	1.636	1.762
X_3=X_2/2="E"	.630	.818	.881
"G" for 9 teeth or less	3.075	3.50	4.063
"G" for 10, 11 and 12 teeth	2.500	3.000	3.500
"G" for 13, 14 and 15 teeth	2.250	2.500	3.000
"G" for 16 teeth or more	1.5375	1.75	2.0365

TABLE 14
A.P.I. STANDARD SPROCKET DIMENSIONS AND TOOTH FORM
A.P.I. CHAIN NO. 3

See Figure 6 and Figure 7
All Dimensions in Inches, except "F," which is given in degrees

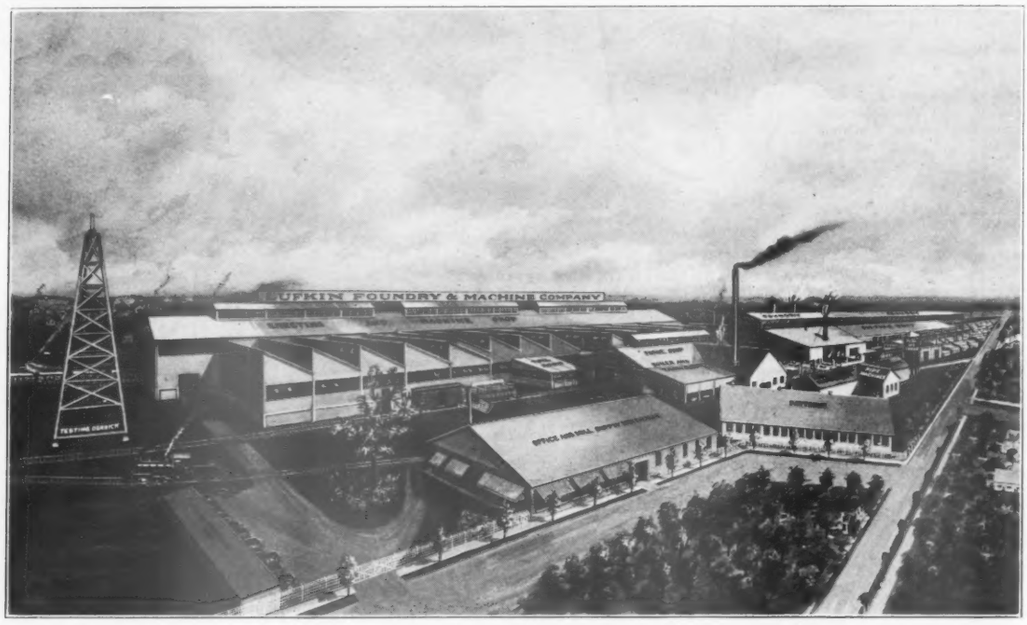
	Number of Teeth "N" 6	7	8	9	10	11	12	13	14	15	18	21	24	27	30	33	36
A	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
B	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16
C	4.891	5.828	6.776	7.732	8.692	9.656	10.622	11.591	12.560	13.531	16.449	19.373	22.299	25.228	28.159	31.092	34.023
D	6.150	7.087	8.035	8.991	9.951	10.915	11.881	12.850	13.819	14.790	17.708	20.632	23.558	26.487	29.418	32.351	35.282
E	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517	.517
F	10	10	10	10	12	13.7	15	15.4	17.1	18	20	21.4	22.5	23.3	24	24.55	25
G	3.075	3.075	3.075	3.075	2.500	2.500	2.500	2.250	2.250	2.250	1.5375	1.5375	1.5375	1.5375	1.5375	1.5375	1.5375
H	.160	.180	.200	.220	.240	.260	.280	.300	.320	.340	.400	.460	.530	.610	.670	.730	.810
K	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328
L	.092	.092	.092	.092	.092	.092	.092	.092	.092	.123	.123	.123	.123	.154	.154	.154	.154
M	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559	.559
P	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075	3.075
Q	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391	1.391
T	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16

TABLE 15
A.P.I. STANDARD SPROCKET DIMENSIONS AND TOOTH FORM
A.P.I. CHAIN NO. 3½

See Figure 6 and Figure 7
All Dimensions in Inches, except "F," which is given in degrees

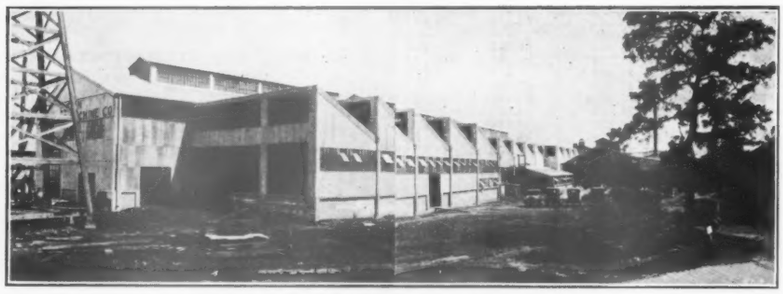
	Number of Teeth "N" 6	7	8	9	10	11	12	13	14	15	18	21	24	27	30	33	36
A	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝
B	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16
C	5.374	6.431	7.510	8.597	9.690	10.788	11.887	12.989	14.093	15.198	18.520	21.847	25.179	28.512	31.847	35.186	38.522
D	7.000	8.067	9.146	10.233	11.326	12.424	13.523	14.625	15.729	16.834	20.156	23.483	26.815	30.148	33.483	36.822	40.158
E	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818	.818
F	10	10	10	10	12	13.7	15	15.4	17.1	18	20	21.4	22.5	23.3	24	24.55	25
G	3.500	3.500	3.500	3.500	3.000	3.000	3.000	2.500	2.500	2.500	1.750	1.750	1.750	1.750	1.750	1.750	1.750
H	.180	.200	.220	.240	.260	.290	.310	.340	.360	.390	.460	.540	.610	.700	.770	.850	.929
K	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328
L	.105	.105	.105	.105	.105	.105	.105	.105	.140	.140	.140	.140	.175	.175	.175	.175	.175
M	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453	.453
P	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500	3.500
Q	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478	1.478
T	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16

SEE PRACTICAL DEMONSTRATION



GENERAL VIEW OF LUFKIN FOUNDRY AND MACHINE CO., LUFKIN, TEX.

The Lufkin Foundry and Machine Company plant at Lufkin, Texas, is an institution that has been built and is maintained on the quality of the products manufactured there. To the oil industry it has been rendering universal satisfaction in its drilling and pumping units and hoists.



Marked advantages follow naturally in the course of adoption of Lufkin Units for drilling and pumping. A short time ago, they were an innovation, but are now standard equipment in the oil fields. Automatically oiled, they require but little attention. Parts subject to greatest wear are easily renewable. An absolutely steady and equalized load is maintained on rods. There is no "back lash" on worm gears and they maintain the highest efficiency until completely worn out.

Lufkin Units may be used with electric motor or gas engine—in new fields, lacking electric power, they may use gas engine and later replace with electric power at slight additional expense. Units are used for cable drilling or in combination with rotary drilling as well as pumping. Lufkin Hoists do the work of the standard rig with more speed and flexibility. All loads are handled with friction clutch—positive clutches are used only in changing speeds—thus keeping loads under absolute control.

The Trout counter balanced crank acts as a fly wheel when working over a well—when pumping, it can be adjusted to an even balance with well to give absolutely steady motion to sucker rods. There is no "whip" in centrifugal counter balance.

The average cost of installation with concrete is $150.00 to $300.00. When relocated the only loss is the foundation—the salvage value is in excess of 90 per cent and the fire hazard is practically eliminated.

Considering all things, the cost is only slightly higher than an all steel standard rig . . . and the added value is obvious.

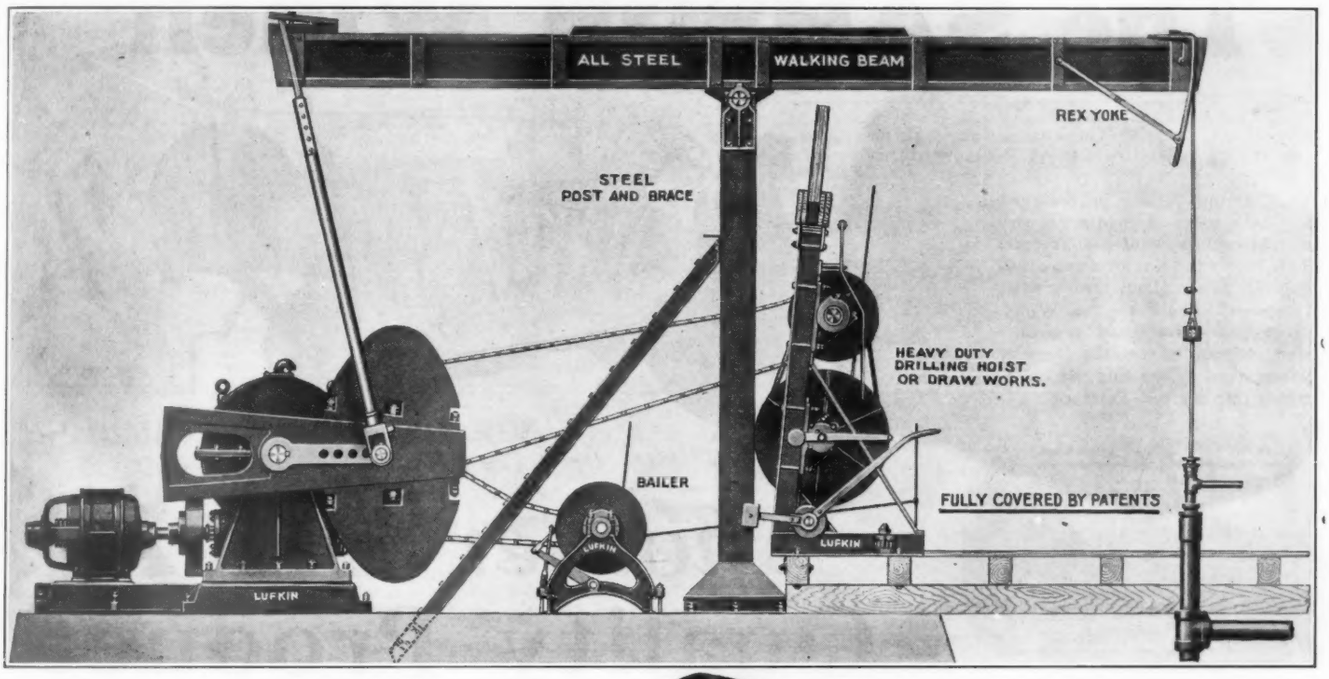
THE LUFKIN FOUNDRY AND MACHINE CO.

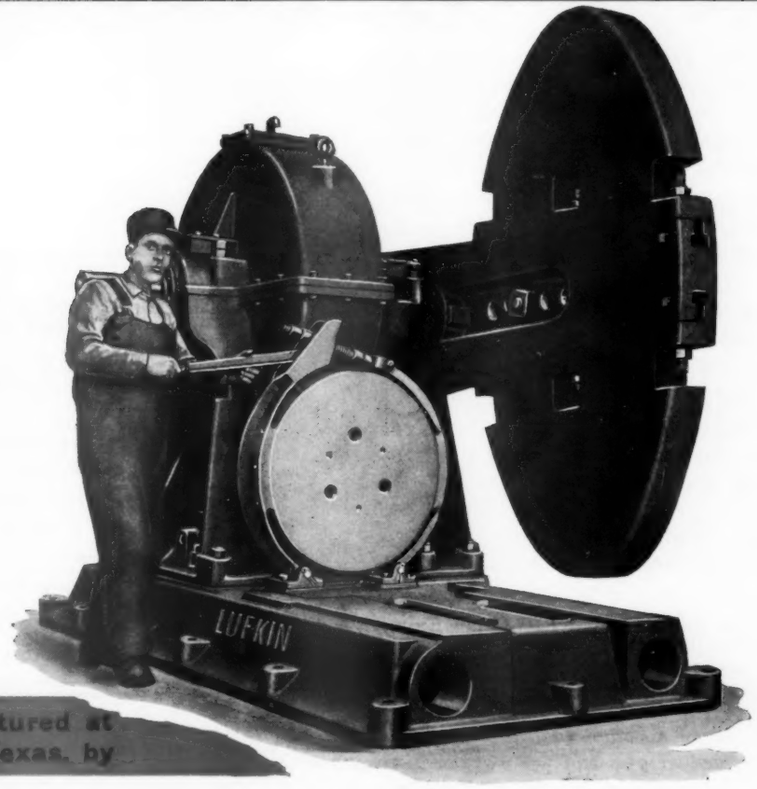
District Offices:

TULSA, OKLA. HOUSTON, TEXAS

LOS ANGELES, CAL. EL DORADO, ARK. NEW YORK, N. Y.

OF LUFKIN UNITS AT EXPOSITION





LUFKIN Units by the hundreds are daily increasing pumping efficiency in—

Seminole	100
Spindletop	75
Liberty	65
Mehan	30
Russia	25
Sour Lake	6
California	35
Pierce Junction	20
Corsicana	10
Hull	25
Davenport	14
Mexico	12
Goosecreek	30
Smackover	35
West Texas	40
Wewoka	17
Morris	6

LUFKIN Units are now equipped with a powerful brake. Every operator will appreciate this added convenience.

Manufactured at Lufkin, Texas, by

THE LUFKIN FOUNDRY AND MACHINE CO.

District Offices:

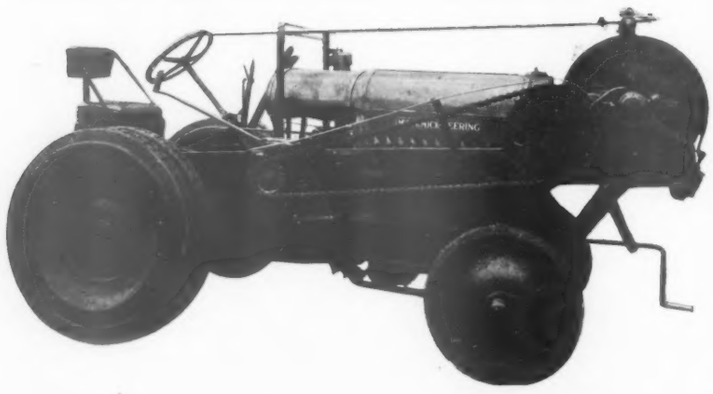
TULSA, OKLA. HOUSTON, TEXAS

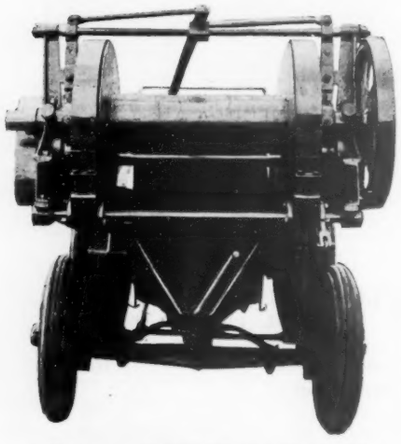
LOS ANGELES, CAL. EL DORADO, ARK. NEW YORK, N. Y.

THE B & A QUALITY LINE **B&A** OIL FIELD PRODUCTS

The SAMSON Winch

The Samson Winch is designed and built so as to change no part of the mechanism of the Tractor. This leaves the tractor a powerful, floating power plant, transmitting its power direct to the Winch through a three-speed transmission connected to the regular power take-off, putting no addition strain on the Tractor.





A Few of the Many Uses of the Samson Winch

Pulling Rods and Tubing.
Bailing and Cleaning Out Wells.
Pile Driving.
Construction Work.
Hoisting Concrete Buckets and Materials of All Kinds.
Loading and Unloading Heavy Materials from Freight Cars or Ships.
House Moving.
Stump Pulling.
Operating Cars in Mines or Stone Quarries.
Back Filling Ditches and Pipe Lines.
Logging.
Excavating.

Another B & A Quality Product

A PRODUCT of the oil fields, tested and proven the Samson Winch meets the requirements of oil field work which demands power, durability, speed and safety.

The Samson Winch is built *on* and not into the International or Fordson Tractor. Two men can install it in 45 minutes. Operated from the tractor seat, the operator faces his work at all times making it more safe for both the man operating the Winch and the men in the rig.

The Samson Winch and the Tractor make the most economical lifting unit on the market today. Get in touch with us now for specifications and prices. You have use for the Samson wherever there is lifting to do.

At the International Petroleum Exposition visit the B & A Exhibit, Booths 96-97-98-113-114-115 Oklahoma Building.

The **B & A** *Quality Line*

Baker Casing Shoe Company
Bartlesville Supply Company
Acme Fishing Tool Company
Garrott Brass & Machine Company
Dexter Valve Reseating Machines
Novo Engine Company
Robinson Orifice Fitting

We also carry a complete line of hoists, concrete mixers, wheelbarrows and woodworking machinery.

B & A Specialty Co.

220 East Brady St. **Tel. 3-3282**

TULSA, OKLAHOMA

708 Keystone Bldg., Houston, Texas

TABLE 16
A.P.I. STANDARD SPROCKET DIMENSIONS AND TOOTH FORM
A.P.I. CHAIN NO. 4
See Figure 6 and Figure 7
All Dimensions in Inches, except "F," which is given in degrees

	Number of Teeth "N"														
	6	7	8	9	10	11	12	13	14	15	18	21	24	27	30	33	36
A	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝
B	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞
C	6.364	7.602	8.755	10.117	11.386	12.660	13.936	15.216	16.497	17.780	21.636	25.499	29.366	33.236	37.108	40.983	44.856
D	8.126	9.364	10.617	11.879	13.148	14.422	15.698	16.978	18.259	19.542	23.398	27.261	31.128	34.998	38.870	42.745	46.618
E	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881	.881
F	10.0	10	10	10	12	13.5	15.0	15.4	17.1	18.0	20	21.4	22.5	23.3	24.0	24.55	25.0
G	4.063	4.063	4.063	4.063	3.500	3.500	3.500	3.000	3.000	3.000	2.0365	2.0365	2.0365	2.0365	2.0365	2.0365	2.0365
H	.210	.230	.255	.280	.300	.330	.360	.390	.420	.450	.540	.630	.710	.800	.880	.970	1.060
K	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732	1.732
L	.122	.122	.122	.122	.122	.122	.122	.122	.122	.163	.163	.163	.163	.203	.203	.203	.203
M	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716	.716
P	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063	4.063
Q	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716	1.716
T	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16

(Continued from Page 241)

N=Number of teeth.
P=Pitch. See Table 4.
T=Radius of crest (profile)=3/16 inch for all sprockets.
Q=Radius of arc (outline)=P/16+(0.36) (P).

A.P.I. No.	Roller Dia. "A"	Roller Width "B"	Pitch "P"
3	1¼	1 7/16	3.075
3½	1⅜	1 7/16	3.500
4	1⅜	1⅞	4.063

Values of Pressure Angle "F"

10	degrees	for	6 teeth
10	degrees	for	7 teeth
10	degrees	for	8 teeth
10	degrees	for	9 teeth
12	degrees	for	10 teeth
13.7	degrees	for	11 teeth

SUGGEST METHOD OF PROCEDURE IN LAYING OUT A.P.I. SPROCKET TOOTH PROFILES TO BE FOLLOWED IN THE ORDER SHOWN BELOW:

1. Having given the chain size and number of teeth.
2. Determine pitch diameter. Note paragraph 7, Tables 7 and 11.
3. Calculate pitch line clearance. Note paragraph 9, Table 8.
4. Calculate radius "E" of working circles. Note paragraph 10-c, Table 13.
5. Calculate pressure angle. Note paragraphs 11-a, 11-b, 11-c. Table 10.
6. Calculate length of flat face. Note paragraph 12, Table 9.
7. Calculate radius "G" of upper flank. Note paragraph 13, Table 13.
8. Lay out crest. Note paragraph 14.

A. P. I. DIMENSIONAL STANDARDS, LINE SHAFTS, ROTARY DRILLING

(a) These specifications were prepared by the Special A.P.I. Committee on the standardization of rotary drilling equipment, appointed by the board of directors of the American Petroleum Institute.

(b) The sizes of shafting and keys, and sprocket tooth form, were selected from A.P.I. standards No. 7: "transmission standards."

(c) The classes of fits and tolerances were selected from the tentative American standard: "tolerances, allowances, and gauges for metal fits, B4-A, 1925," published by the American Society of Mechanical Engineers and approved by the American Engineering Standards Committee.

(d) No attempt has been made to specify the size of the jaws of clutches, clutch sprockets, and lengths of line shafts or keys, due to different arrangements of sprockets in conjunction with hoisting drums now being used by various manufacturers. Care in this regard should be exercised by the purchaser of repair parts.

(e) It is recommended by the Special A.P.I. Committee on the standardization of manila cordage that catheads shall be made of wear-resisting material, properly heat treated to prevent grooving, and the diameter be not less than 10 inches.

Section 1—Material Covered

1-a. These specifications apply to line shafts (complete) used in rotary drilling. They are dimensional only, and apply to new equipment, and do not include either chemical or physical properties of materials, except as applying to finish.

Section 2—Workmanship and Finish

2-a. All machined or mating surfaces shall be finished in a good and workmanlike manner and shall be free from burrs, rough edges, etc. All castings shall be of good quality, free from blow holes, rough edges chipped or ground off, and shall be thoroughly cleaned.

Section 3—Marking

3-a. Complete line shafts, or parts, manufactured in accordance with these specifications shall be stamped or marked with the A.P.I. monogram as stipulated herein, in addition to the manufacturer's name or identifying mark. Complete line shafts, or parts, which do not comply with these specifications shall not be stamped with the A.P.I. monogram. Authority to use the A.P.I. monogram will be granted in accordance with the conditions contained in the appendix.

3-b. Where the A.P.I. monogram is specified on mill rolled or forged material, it shall be applied with a steel stencil, size of monogram to be one-half inch high.

3-c. Where the A.P.I. monogram is specified on cast material, the design of the monogram shall be affixed to the pattern, letters to be 1½ inches long, in a 2-inch circle; height of circle and letters to be not less than one-eighth inch.

Section 4—Line Shafts

4-a. Three sizes of line shafts are standard: 4, 5 and 6-inch.

4-b. Shafts, bores in mating members,

FRANK F. HILL
Rotary Drilling Equipment.

keys and keyways for A.P.I. rotary line shafts manufactured in accordance with Figures 1 and 2 and Table 1; Figure 3 and Table 2; and Figure 4 and Table 3, are standard.

4-c. The sprocket tooth form shall be the A.P.I. standard. (See A.P.I. standards 7: "transmission standards"). Sprockets shall be tested before shipment to insure proper engagement with A.P.I. standard chain.

4-d. Line shafts (bare) and keys manufactured in accordance with these specifications shall be stamped (by a steel stencil) with the A.P.I. monogram as follows:

Line shafts: On the end.

Keys: On the upper side, near the gib head, to be visible when in place.

4-e. Sprockets, clutches and catheads, manufactured in accordance with these specifications, shall have the A.P.I. monogram cast on the same side as the manufacturer's name or identifying mark; size of monogram to be as specified in Section 3.

Section 5—Inspection and Rejection

5-a. The inspector representing the

J. A. BOLLER
Rotary Drilling Equipment.

purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacture of the material ordered hereunder. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

5-b. Where inspector representing the

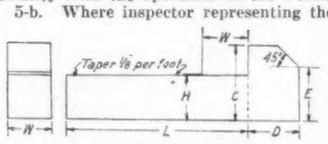


Figure 1—Gib-Head Taper Keys

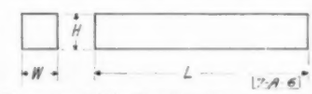


Figure 2—Plain Feather Keys, (Square)

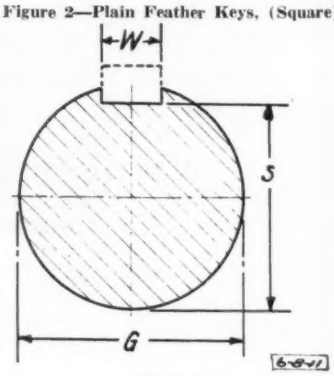


Figure 3.

TABLE 1
KEYS FOR A.P.I. STANDARD ROTARY LINE SHAFTS
See Figure 1 and Figure 2
All Dimensions in Inches at 68 Degrees FaFhrenheit.

Member	Nominal Shaft "T" Size	Keys					Width		Height*	
		Type	Nominal Size	Taper In. Per Foot	Length "L"		"W"	Tolerance	"H"	Tolerance
Tight Members, keyed	4	Taper	1 x 3/4	1/8	Optional		1.000	+.000 −.003	.750	+.003 −.000
Sliding Members, keyed	4	Feather	1 x1	...	Optional		1.000	+.000 −.003	1.000	+.003 −.000
Tight Members, keyed	5	Taper	1-1/4x 7/8	1/8	Optional		1.250	+.000 −.003	.875	+.003 −.000
Sliding Members, keyed	5	Feather	1-1/4x1-1/4	...	Optional		1.250	+.000 −.003	1.250	+.003 −.000
Tight Members, keyed	6	Taper	1-1/2x1	1/8	Optional		1.500	+.000 −.003	1.000	+.003 −.000
Sliding Members, keyed	6	Feather	1-1/2x1-1/2	...	Optional		1.500	+.000 −.003	1.500	+.000 −.003

*The height "H" is measured at the distance "W" from gib on taper keys.
The dimensions indicated in Figure 1 and not shown in the above table are not essential to the fit; they can be obtained from A.P.I. standards 7: "transmission standards."

TABLE 2
SHAFT DETAILS FOR A.P.I. STANDARD ROTARY LINE SHAFTS
See Figure 3
All Dimensions in Inches at 68 Degrees Fahrenheit.

Member	Shaft Diameter			Key			*Keyway			
	Nominal "T"	"G"	Tolerance	Type	Nominal Size		Width "W"	Tolerance	Diam. of Shaft to Bot. of Keyway "S"	Tolerance
Tight Members, keyed	4	3.995	+.000 −.003	Taper	1 x 3/4		1.000	+.003 −.000	3.6250	+.000 −.006
Sliding Members, keyed	4	3.995	+.000 −.003	Feather	1 x1		1.000	+.003 −.000	3.4380	+.000 −.006
Tight Members, keyed	5	4.995	+.000 −.003	Taper	1-1/4x	7/8	1.250	+.003 −.000	4.5625	+.000 −.006
Sliding Members, keyed	5	4.995	+.000 −.003	Feather	1-1/4x1-1/4		1.250	+.003 −.000	4.2500	+.000 −.006
Tight Members, keyed	6	5.995	+.000 −.003	Taper	1-1/2x1		1.500	+.003 −.000	5.5000	+.000 −.006
Sliding Members, keyed	6	5.995	+.000 −.003	Feather	1-1/2x1-1/2		1.500	+.003 −.000	5.1250	+.000 −.006

*All keyways shall be cut on a diametral center line; see Figure 5 for explanation of tolerances on taper keys.

IN the purchase of valve specialties, Davis equipment is the exclusive choice of a great majority of experienced users.

First, because Davis Valve Specialties have proved their ability to stand up under the hardest service conditions and deliver consistently good performance.

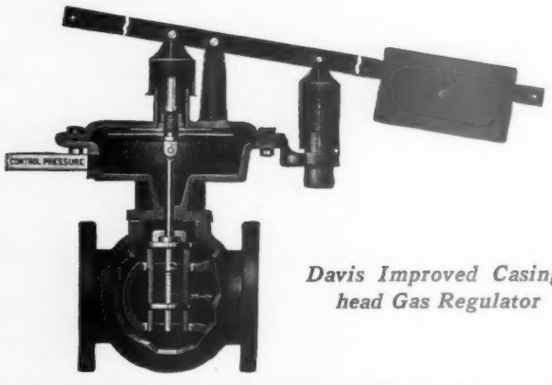
Second, because the design of Davis Valve Specialties is simple, logical and efficient and the manufacture and finish up to the highest standards.

Even a casual examination of a Davis Casing Head Gas Regulator, for example, shows that it will work smoothly and accurately, and last a long, long time.

You can see for yourself that Davis Valve Specialties are good, or you can take the experience of hundreds of users as a guide. Either way you buy performance when you buy Davis equipment.

G. M. DAVIS REGULATOR CO.
409 Milwaukee Avenue
CHICAGO, ILLINOIS

WESTCOTT & GREIS, *Inc.*
Sales Engineers
Tulsa LOS ANGELES Dallas



Davis Improved Casinghead Gas Regulator

Valve Makers For Over Fifty Years
DAVIS VALVE SPECIALTIES

O&GJ 9-22 Gray

purchaser desires to witness these tests, reasonable notice shall be given of the time at which test is to be made.

5-c. Material manufactured in accordance with these specifications which proves to be defective subsequent to acceptance at manufacturer's works or when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections under these or any other specifications are to be stamped with the A.P.I. monogram. When material stamped or marked with the A.P.I. monogram is rejected, such monogram shall be canceled as follows:

5-d. On cast material, the loop in the letter "P" shall be chipped off; on forged or wrought material, a steel canceling stencil one-half inch square shall be applied twice; first, horizontally; the stencil then turned 90 degrees and applied the second time.

bottom of keyway, in inches;

S=The diameter of shaft to the bottom of keyway, in inches;

T=Nominal diameter of shaft, in inches.

The reason for deducting .017 inch

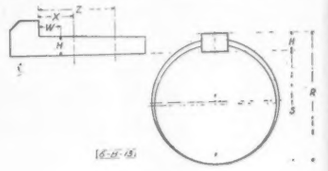
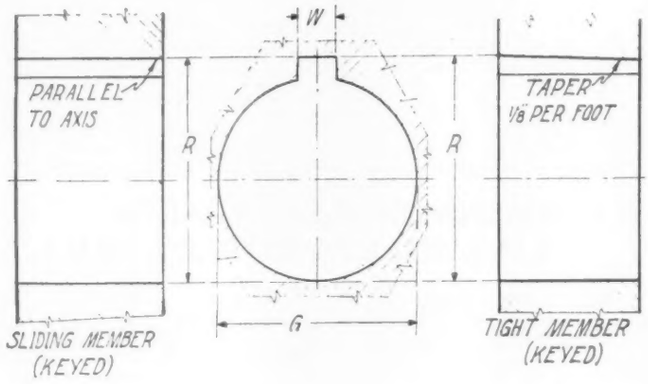


Figure 5

from the nominal depth of the keyway in the bored member is to establish the minimum projection of the key greater than "W".



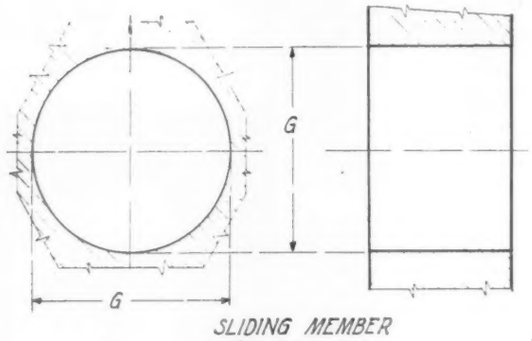


Figure 4—Bored Members

TABLE 3
DETAILS OF BORED MEMBERS FOR A.P.I. STANDARD ROTARY LINE SHAFTS
See Figure 4
All Dimensions in Inches at 68 Degrees Fahrenheit.

Member	Diameter of Bore: Nominal "G"	Diameter of Bore: Actual Tolerance	Keyway*: Type of Key	Keyway*: Nominal Size of Key	Keyway*: Width "W"	Keyway*: Width Tolerance	Keyway*: Diam. of Shaft to Bot. of Keyway "R"	Keyway*: Diam. of Shaft to Bot. of Keyway Tolerance
Tight Members, keyed	4	4.000 +.002 −.000	Taper	1 x 3/4	1.000	+.003 −.000	4.3580	+.000 −.000
Sliding Members, keyed	4	4.015 +.005 −.000	Feather	1 x1	1.015	+.010 −.000	4.4680	+.000 −.000
Sliding Members, not keyed	4	4.005 +.003 −.000	.....	.....	....	.....	.....	.....
Tight Members, keyed	5	5.000 +.002 −.000	Taper	1-1/4x 7/8	1.250	+.003 −.000	5.4205	+.000 −.000
Sliding Members, keyed	5	5.015 +.005 −.000	Feather	1-1/4x1-1/4	1.265	+.010 −.000	5.5310	+.000 −.000
Sliding Members, not keyed	5	5.005 +.003 −.000	.....	.....	....	.....	.....	.....
Tight Members, keyed	6	6.000 +.002 −.000	Taper	1-1/2x1	1.500	+.003 −.000	6.4830	+.000 −.000
Sliding Members, keyed	6	6.015 +.005 −.000	Feather	1-1/2x1-1/2	1.515	+.010 −.000	6.6560	+.000 −.000
Sliding Members, not keyed	6	6.005 +.003 −.000	.....	.....	....	.....	.....	.....

*Note: All keyways shall be cut on a diametral center line; see Figure 5 for explanation of tolerances on taper keys.

Projection of Taper Keys Under Maximum and Minimum Tolerances

The numerical values of "R" and "S" are computed as follows:

R=(T+H/2—.017) +.006 inch
—.000 inch

S=(T—H/2)+.000 inch
—.006 inch

Where

R=The diameter of the bore to the

A difference of .001 inch in "H" is equivalent to a movement of .096 inch measured parallel to the base of the key from "W".

W=The distance from the gib-head at which the values for "H" are computed.

X=Minimum projection of key with keyways ("R" minus "S") at max-

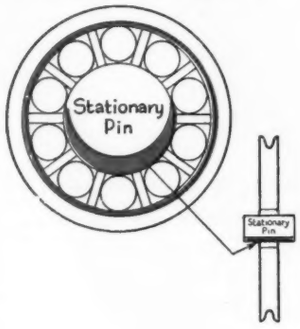
BIG red block

Regan's

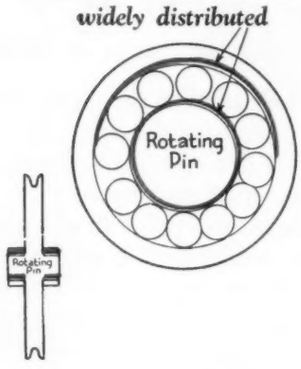
—of course

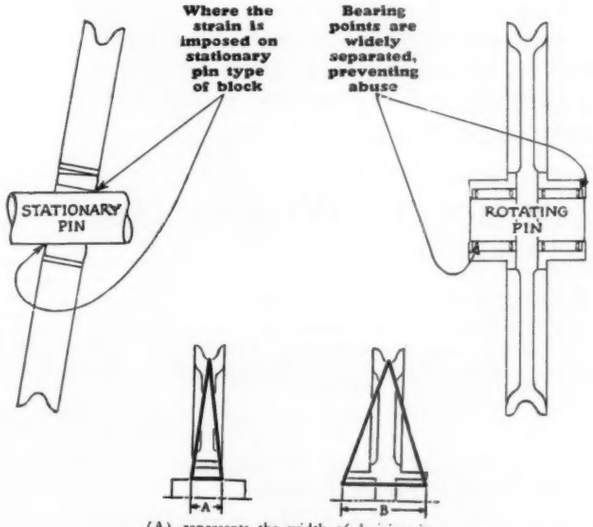
Longer life to wire lines.
Slippage of lines eliminated.
Freely rotating sheaves.
Rotating pin principle.
Two bearings for each sheave.
Anti-friction bearings.
No destructive strain on bearings.
Fastest speed.
Alemite lubrication.
Sheaves conform to A.P.I. specifications.

Stationary Pin Type Blocks are subject to concentrated wear.



Regan Pins rotate and therefore the wear is widely distributed

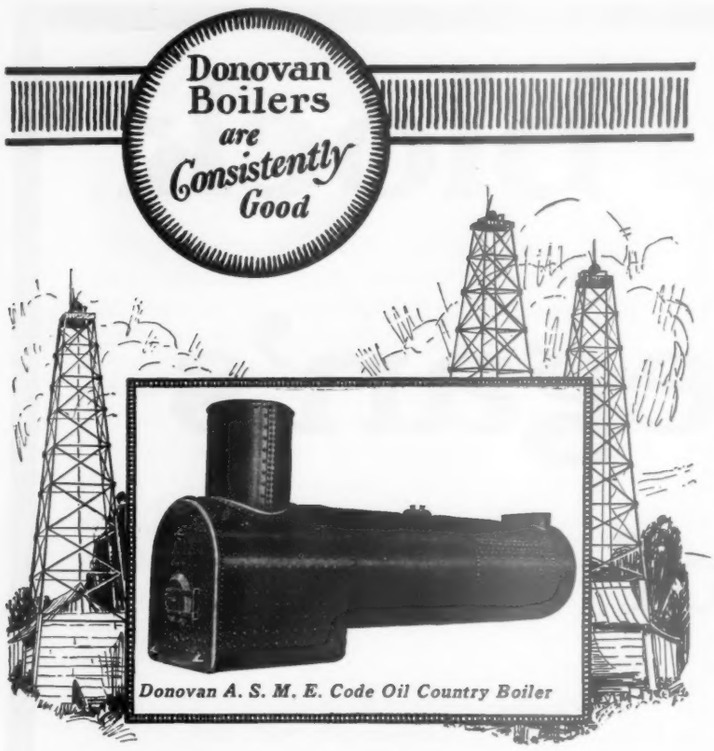



Where the strain is imposed on stationary pin type of block
Bearing points are widely separated, preventing abuse
STATIONARY PIN
ROTATING PIN
A
B

(A) represents the width of bearing in a stationary pin type block. (B) represents the width of bearing area in Regan rotating pin block. The wider area of the bearing in the Regan Block assures rigidity and prolongs life.

Regan
Forge & Engineering Co.
Manufacturers of Oil Well Equipment
Quality
San Pedro, California U.S.A.

Houston, Texas 1521 Post Dispatch Bldg.
New York City 75 West St. Wm. Braat, Manager
Oklahoma City, Okla. 531 W. Main St.
Maracaibo, Venezuela Wm. Adams, Care Amer. Consul
Pampa, Texas



Donovan A. S. M. E. Code Oil Country Boiler

Our new 200 lb. W. P. boilers are now available in 75 and 85 H. P.

Frick-Reid Supply Company now have these in stock at various stores in mid-continent fields and we are carrying them in stock at the plant for prompt shipment.

These boilers are the same general design as our others with the big dome over firebox insuring lots of dry steam at all times. They are much under rated in horse power and big enough to meet your requirements. They meet all A.S.M.E. requirements as well as our careful inspection and are built by the best workmen to be found anywhere.

Our hearty endorsement goes with every one of them and, frankly speaking, with 45 years experience with oil country boilers, we believe we know how to build a good boiler.

Manufactured by

DONOVAN BOILER WORKS, INC.

PARKERSBURG, W. VA.

NEW YORK OFFICE—30 Church Street

FRICK-REID SUPPLY COMPANY
Mid-Continent Distributors

GREAT NORTHERN TOOL & SUPPLY CO.
MIDLAND IRON WORKS
Montana Distributors

All Leading Supply Houses Throughout the Eastern Fields Handle

DONOVAN QUALITY PRODUCTS

NONE BETTER

imum depth and height of key ("H") at minimum.

Z=Maximum projection of key with keyways ("R" minus "S") at minimum and height of key ("H") at maximum.

Examples: Position of 1 inch by three-quarter inch key in 4-inch shaft.

Minimum projection "X"
"W"=1 inch
"H"=.750 inch =.750 inch
"R" minus "S"=4.364 inches
minus 3.619 inches =.745 inch

Difference =.005 inch

Whence (5) (0.096)=.480 inch, therefore projection "X" equals "W" plus .480 inch or 1.480 inches.

Maximum projection "Z".
W=1 inch
H=0.750 inch + .003 inch=.753 inch
"R" minus "S"=4.358
inches minus 3.625 inches=.733 inch

Difference =.020 inch

Whence (20) (.096)=1.920 inches, therefore projection "Z" equals "W" plus 1.920 inches or 2.920 inches.

A. P. I. SPECIFICATIONS ON ROTARY DRILLING TAPER JOINTS

a. These specifications were prepared by the Special A.P.I. Committee on the Standardization of Rotary Drilling Equipment, and are the result of extensive investigations embracing a period of over three years. Comprehensive field tests were made on various types before finally deciding on the joints specified herein.

b. The 5 by 6—4 and 4½ by 5½—4 joints were originally designed by the Union Tool Co., Torrance, Calif., and have been in actual use for many years in all the oil fields of the United States and abroad. The gauge dimensions shown in Table 2 were based upon pitch diameters 1 inch from gauge top of 5.6958 inches and 5.14140 inches, respectively, furnished by the Union Tool Co.

c. The 7 by 8—4 joint was designed by E. M. Smith Co., Los Angeles, Calif., and has been in actual service for considerable length of time, for use with 8⅝-inch outside diameter or similar sized drill pipe. The dimensions shown in Table 2 were based upon radial measurements of pitch diameter over wire, 0.200-inch diameter, at five-eighths inch step, equal to 4.0256 inches, furnished by the E. M. Smith Co.

d. It should be noted that the American Petroleum Institute has not officially adopted any drill pipe larger in size than 6⅝-inch outside diameter. However, due to the occasional use of 8⅝-inch and similar-sized drill pipe, it was considered desirable to set up a standard taper joint for use therewith. It should be borne in mind, therefore, that variations may exist in the pipe ends of rotary tool joints in this size and threads desired to fit his drill pipe in the 8⅝-inch outside diameter or similar sizes.

e. The other sizes of taper joints contained herein are new, and were devoloped by the committee. These other sizes, however, so closely approximate sizes and threads now in general use, that specified field tests were considered unnecessary. The dimensions given in Table 2 on the first four sizes were based upon diameter "A" at small end, as given in Table 1.

f. In all cases in computing thread height and truncation, account has been taken of the effect of taper in reducing thread height for a given pitch, as compared with values for the same pitch on a cylinder.

g. The thread specified herein conforms to the national form of thread, except as to truncation of crests and roots, which is definitely specified.

h. Particular attention is directed to the method adopted herein for identifying rotary drilling taper joints, viz: the taper joint is known by the size drill pipe with which tool joints must be used. For example, the 5 by 6—4 rotary tool joint is used with 6⅝-inch drill pipe and will be identified and marked as 6⅝-inch joint. In order to identify the joints in the tables of drill collars, fishtail bits, couplings, etc., the size drill pipe is listed with the nominal size of taper joint. However, this does not prevent the taper joints being used in any combination desired for drill collars and fishtail bits.

Section 1—Material Covered

1-a. These specifications apply to taper joints and essential dimensions of the following material used in rotary drilling: Rotary tool joints, fishtail bits, drill collars, rotary driving (grief) stem and couplings, swivel connections.

1-b. Material manufactured in accordance with these specifications is standard.

1-c. The standards contained herein are dimensional only and apply to new material.

1-d. This specification does not include either chemical or physical properties of material.

Section 2—Workmanship and Finish

2-a. All machined surfaces shall be finished in a good and workmanship manner and shall be free from burrs, rough edges, etc.

2-b. All rotary drilling taper joints shall be covered before shipment with a suitable lubricant in order to minimize the possibility of corrosion, and shall be adequately protected to prevent damage to threads.

2-c. All taper joints (except the fishtail bits) shall be heat treated, or treated by some other suitable method of manufacture, in order to minimize the chance of galling. No methods of treatment are specified, since this is dependent on the chemical and physical properties of the materials used.

Marking

2-d. Material manufactured in accordance with these specifications shall be marked with the manufacturers' name or identifying mark, size and the A.P.I. monogram.

2-e. Size of monogram to be one-half inch square.

2-f. Location of markings, sizes of material, etc., shall be as specified hereinafter for each of the items covered by these specifications.

2-g. For the purpose of marking, the "size" of taper joints shall be the nominal size of the drill pipe.

2h, No material shall be stamped with the A.P.I. monogram that does not comply with these specifications. Authority to use the A.P.I. monogram will be granted in accordance with the rules and conditions contained in the appendix.

Section 3—Taper Joints

3-a. The sizes of taper joints shown in Table 1 and Figures 1 and 5 are standard.

3-b. Basic Thread Form, Profile: The angle between the sides of the thread is 60 degrees, measured in the axial plane, and the line bisecting this angle is perpendicular to the axis of the joint. The crest is truncated parallel to the taper to produce a flat of 0.050-inch (See "A," Figure 1) on four-thread and similarly truncated to produce a flat of 4.040 inch on five-thread, (See "A," Figure 1), while the root is rounded a sufficient amount to clear the mating threads on both four five threads. Both flats are measured parallel to the axis.

Basic Thread Form
"A"=.040" on 5-thread
"A"=.050" on 4-thread
Truncation is parallel to taper, measured parallel to axis.

3-c. Pitch: The number of threads per inch on all sizes up to and including the 3 9/16-inch by 4⅝-inch is 5, and on all sizes over 3 9/16-inch by 4⅝-inch is 4, as specified, measured in a direction parallel to the axis of the thread.

3-d. Taper of Joints: The taper of all

(Continued on Page 289)

At Last

A Perfect Sucker Rod

The Buffalo Sucker Rod is designed to overcome all possible difficulties encountered in the use of this vitally necessary product.

Made from special steel rolled in our own Plant, treated to secure the maximum tensile strength and at the same time show a high elastic limit, forged by experts, it presents an ideal fixture which will be found perfectly satisfactory for the needs of all fields.

Try a car and be happy.

Don't forget our re-enforced Pull Rods with drop forged clamps. They satisfy.

BUFFALO BOLT COMPANY

NORTH TONAWANDA, N. Y.

Sales Offices:

Pioneer Trust Bldg.
Kansas City, Mo.

General Motors Bldg.
Detroit, Mich.

Monadnock Bldg.
Chicago, Ill.

-ask us another?

THEODORE N. BARNSDALL
Founder

1 HOW long has the name of Barnsdall been identified with the petroleum industry?

Ever since the discovery of petroleum in the year 1859—68 years ago.

—B—

2 HOW was the Corporation named Barnsdall?

For Theodore N. Barnsdall, pioneer oil man, whose father, William Barnsdall, built the first refinery in the United States.

—B—

3 HOW much assets has Barnsdall?

Over Seventy Million Dollars. ($71,190,773.15)

—B—

4 HOW many stockholders has Barnsdall?

Over 4,500.

—B—

5 HOW many subsidiary companies has Barnsdall?

27—Twenty-seven—27.

—B—

6 HOW many branches of the petroleum industry is Barnsdall engaged in?

All branches—Finding—Leasing—Developing—Drilling—Producing—Transporting—Refining—Marketing—Distributing—Exporting.

—B—

7 HOW much Crude Oil per day is produced by Barnsdall?

Over 30,000 barrels.

—B—

8 HOW many miles of pipe line has Barnsdall?

450 miles of main and gathering lines with pumping stations to transport the crude to the three refineries.

—B—

9 HOW many producing oil wells has Barnsdall?

Over 3,000.

—B—

10 HOW many acres of oil leases has Barnsdall?

Over 200,000 acres from Pennsylvania to California.

—B—

11 HOW many refineries has Barnsdall?

3—MODERN REFINERIES—3 located at Barnsdall, Okla., Wichita, Kan., and Okmulgee, Okla.

—B—

12 HOW many natural gasoline plants has Barnsdall?

12—Twelve—12.

BARNSDALL

BARNSDALL

13 HOW many different Petroleum Products are manufactured by Barnsdall?

Gasoline—Kerosene—Naphtha—Furnace Oil—Gas Oil—Fuel Oil—Motor Oils—Cylinder Stocks—Bright Stocks—Red and Pale Oils—Wax—Petrolatum and all grades of Lubricating Oils, the principal trade mark brand being Be Square.

—B—

14 HOW much crude oil per day can be refined at the three refineries of Barnsdall?

Over 20,000 barrels.

—B—

15 HOW many bulk depots and gasoline stations has Barnsdall?

326—located in the States of Arkansas, Missouri, Kansas and Oklahoma.

—B—

16 HOW many Automobiles, Trucks and Tractors has Barnsdall?

328—in the oil fields and cities and towns where Barnsdall products are distributed.

—B—

17 HOW many tank cars has Barnsdall?

1105 steel cars of 8,000 and 10,000 gallon capacity, with a small fleet of three-compartment cars for lubricating oils.

—B—

18 HOW much storage for Crude and Refined Products has Barnsdall?

Over 100 Million Gallons.

—B—

19 HOW many dollars were received for products last year by Barnsdall?

Over Thirty Million Dollars. ($30,344,855.81)

—B—

20 HOW many trade marks has Barnsdall?

BE SQUARE Motor Oils

BIGHEART Cylinder Stocks

BARNSDALL Lubricating Oils

SUPER-GAS ANTI-KNOCK MOTOR FUEL

21 HOW and where are Barnsdall products exported?

Through the ports of New Orleans and Mobile to Continental Europe and South America.

—B—

22 HOW many employees has Barnsdall?

Over twenty-four hundred.

—B—

23 HOW are the employees protected that work for Barnsdall?

Each employee and his wife are insured after the employee has been in service six months. Premiums being paid by Barnsdall.

—from the oil well to the jobber

—ask us another?

BARNSDALL REFINERIES, INC.

Executive Offices: Petroleum Building Tulsa, Okla. *Subsidiary* BARNSDALL *Corporation* *General Sales Offices:* 624 S. Michigan Ave. Chicago, Ill.
New York — Pittsburgh — St. Louis — Kansas City — Los Angeles — St. Paul

OIL COUNTRY TUBULAR GOODS

(Continued from Page 198)

TABLE 2
A.P.I. STANDARD CASING THREADS
See Figure 1
All dimensions in inches at 68 degrees Fahrenheit. All weights in pounds.

Casing: Size	External Diameter "O. D."	External Diameter of Upset—"U. D."	Weight per Foot Complete	Threads: Number per Inch "B"	Included Taper Inches per Foot—"b"	Length of Perfect "E"	Number of Perfect	Effective Length—"g"	Total Length—"G"	Height of Thread Truncated—"h"	Diameter of Casing at Root of Threads—"LL"	Diameter of Casing at Top of Threads—"L"	End of Pipe to Center of Coupling—Made up—"J"	Distance End of Coupling Beyond last scratch. Made up—"R.R."	Standoff of Coupling at hand tight fit—**"A"
4¾	4 750	5.000	16.250	10	⅝	2.1750	21 75	2 475	2 875	.0800	4.772	4 932	.625	.000	....
5¾	5 750	.....	All	10	⅝	2 4250	24 25	2 725	3 125	.0800	5.514	5 674	.625	.000	....
5¾	5 750	6 000	All	10	⅝	2.9250	29.25	3 225	3 625	.0800	5 749	5.909	.625	.000	....
8⅛	8.125	.....	All	10	⅝	2.9250	29 25	3 225	3 625	.0800	7 874	8 034	.625	.000	....
8⅛	8.125	8 375	40 000	10	⅝	2 9250	29 25	3 225	3.625	.0800	8 124	8 284	.625	.000	....
10¾	10 750	.....	All	8	¾	3 0000	24.00	3.250	3 625	.1000	10 363	10 563	.625	.000	....
13⅜	13.375	.....	All	8	¾	3 2500	26 00	3 500	3 875	.1000	12 972	13 172	.625	.000	....
16	16 000	.....	All	8	¾	3 2500	26.00	3 500	3 875	.1000	15.597	15.797	.625	.000	....
18⅝	18 625	.....	All	8	¾	3 2500	26 00	3.500	3 875	.1000	18 222	18 422	.625	.000	....
21½	21 500	.....	All	8	¾	3.2500	26.00	3 500	3 875	.1000	21 097	21 297	.625	.000	....
24½	24.500	.....	All	8	¾	3 2500	26 00	3 500	3.875	.1000	24 097	24 297	.625	.000	....

*Column "A" to be filled in at some future date, to be based on actual experience. See Gauging Practice.

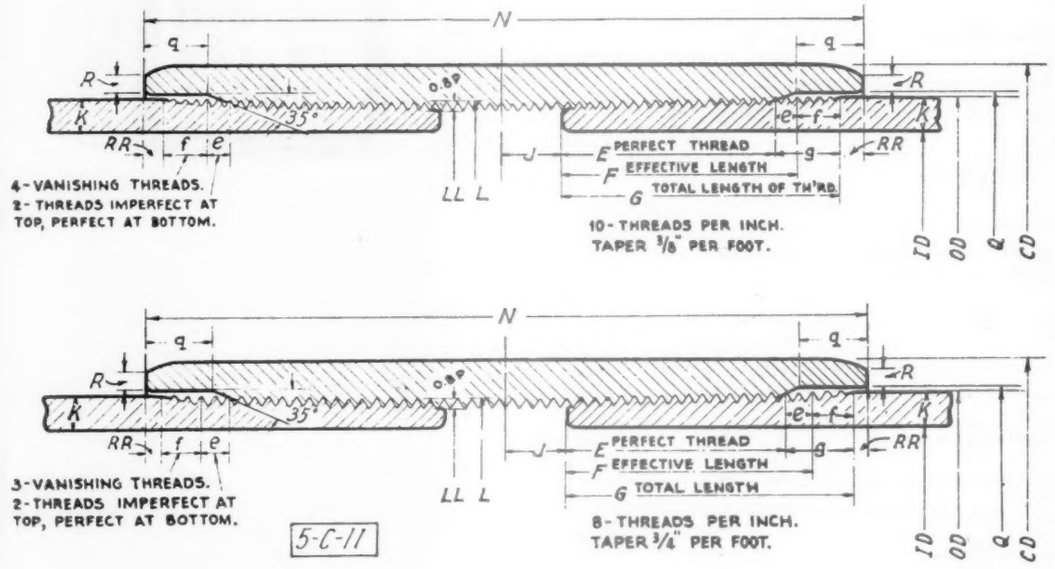


Figure 3

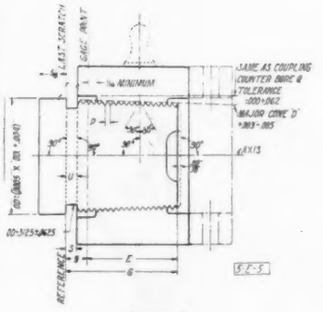


Figure 3

Casing Gauges

(a) All measurements referred to shoulder marked "last scratch."

(b) The small end of gauges are not measuring planes, but are finished square with axis to assist certification.

(c) All dimensions are in inches Standard at 68 degrees Fahrenheit.

(d) The lengths of the gauges from the last scratch are unimportant within the tolerances shown.

(e) The length of the threads in the ring gauge should not be less than ("E" minus 1½ pitches).

(f) The ring gauge may be extended as shown to provide for make-up bar.

(g) The crests of the threads on gauges shall be truncated as indicated in column "h" in gauge tables The roots of the threads on gauges shall be cut to a sharp V, or when ground, shall be undercut to prevent the gauge from bearing on crest or root of the thread on the product.

(h) See Specifications on Gauges for permissible tolerances, etc.

(Continued on Page 263)

TABLE 3—THREADS
A.P.I. STANDARD CASING
See Figure 2
All dimensions in inches at 68 degrees Fahrenheit. All weights in pounds.
(The values given in the following table and in Figure 2 apply to the 4¾-inch, 6⅝-inch and 8⅝-inch, 10-thread, and 9-inch and 11¾-inches, 8-thread, sizes only. These sizes are standard at present and are copied from lists now in use.)

Casing: Size	External Diameter "O. D."	External Diameter of Upset—"U. D."	Weight per Foot Comp.	Threads: Number per Inch "B"	Included Taper Inches per Ft.—"b"	Length of Perfect "E"	Number of Perfect	Effective Length "g"	Total Length—"G"	Height of Thread Truncated—"h"	Diameter of Casing at Root of Threads—"LL"	Diameter of Casing at Top of Threads—"L"	End of Pipe to Center Coupling, made up—"J"	Distance End of Coupling Beyond Last Scratch, made up—"RR"	Stand off of Coupling at handtight fit—**"A"
*4¾	4.750	....	16.000	10	⅝	1.9500	19 50	.150	2.550	.0800	4.529	4 689	.5625	.200	....
*6⅝	6 625	....	All	10	⅝	2 4000	24 00	2 600	3 000	.0800	6 390	6 550	.6125	.200	....
*8⅝	8 625	....	All	10	⅝	2 6500	26 50	2.850	3 250	.0800	8 382	8 542	.6125	.200	....
†9	9 000	....	All	8	¾	2.6250	21.00	2 875	3 250	.1000	8.636	8.836	.6875	.125	....
†11¾	11.750	....	All	8	¾	2 6250	21 00	2 875	3 250	.1000	11 386	11 586	.6875	.125	....

*Same joint and threading as Diamond BX Casing.
†Same joint and threading as Diamond B8 Casing.
**Column "A" to be filled in at some future date; to be based on actual experience. See Gauging Practice.

Specifications for Steel and Iron Pipe For Line Pipe Uses

A special investigating subcommittee was appointed to consider certain questions of chemical and physical properties, lengths, etc., for further consideration by the committees at the December, 1927, meeting of the A.P.I. Pipe Committee to be held in Chicago.

Material Covered

1. These specifications apply to welded and seamless steel, and welded iron tubular goods for line pipe purposes, commonly used to convey gas, water or oil.

SECTION

Manufacture
Process

2-a. The steel for welded line pipe shall be of good welding quality made by the Bessemer, open hearth or electric process. The steel for all seamless line pipe shall be made by the electric or open hearth process.

2-b. The wrought iron shall be made from muck bars made entirely from puddled pig iron, free from any admixture of iron scrap or steel. The term iron scrap applies only to foreign or bought scrap and does not include local mill products free from foreign or bought scrap.

2-c. Welded pipe 3 inches or under, in nominal diameter, may be butt welded unless otherwise specified, or pipe over 3 inches in nominal diameter shall be lap welded.

SECTION 2

Chemical Properties and Tests

3 a. The steel from ladle analysis shall conform to the following requirements as to chemical composition:

	Bessemer	C.H Welded		Seamless		
	Welded	Class I	Class II (Rephos.)	Grade A	Grade B	Grade C
Manganese	.30-.80	.30-.60	.30-.60	.30-.40	.35-.50	.35-1.50
Phosphorus, Not over	....	.11	.045	.04	.04	.04
Not less than	....	....	.045	.04	....	....
Sulphur, Not over	.055	.06	.06	.06	.06	.06

—Foot Note—Rephosphorized open hearth pipe shall be marked by the letter "R" stamped with a steel stencil directly alongside the A.P.I. monogram, the size of the letter to be the same as the A.P.I. monogram.

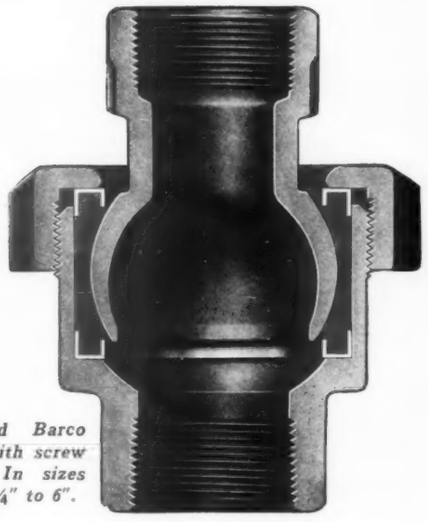
Pipe shall be rated in the table under "physical Properties and Tests" that rephosphorized open hearth welded pipe has higher tensile and higher yield point than Class I open hearth welded pipe, and as a consequence is probably somewhat harder to bend. It probably has better threading and lap welding properties.

3 b. Open hearth iron should contain not less than 99.75 per cent metallic iron.

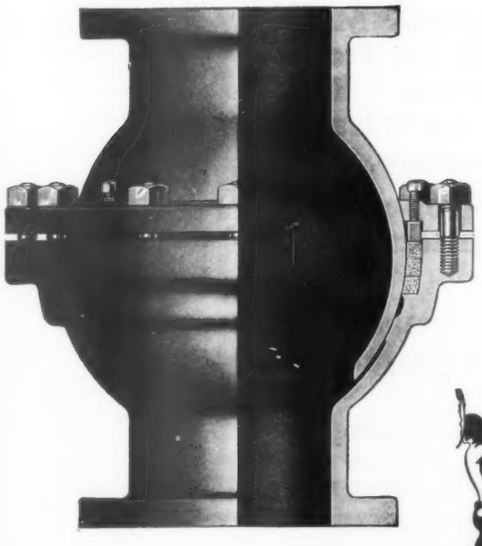
Check Analysis

4-a. Analyses of two lengths of pipe in each lot of 400 or less of each size 2 inches up to, but not including 6 inches, and in each lot of 200 or less of each size 6 inches, or over, may be made by the purchaser from the finished pipe. By agreement between the manufacturer and the purchaser, the analyses may be taken from the skelp, the number of analyses shall be determined in the same manner as when taken from the finished pipe. The phosphorous and sulphur content thus determined shall not exceed

Over 1,000,000 BARCO Flexible Joints in Service



Standard Barco joint with screw ends. In sizes from ¼" to 6".



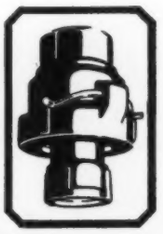
Barco joints with flanged ends are made in sizes from 4" to 48".

ON the connections to filter presses, on loading racks, on drilling rigs, on air compressor lines—wherever movement or vibration of the line causes ordinary joints to wear and leak, try a Barco Flexible Joint. It permits free movement, both swivel and angle, and absorbs vibration without any resulting damage.

Standard sizes from ¼ in. to 48 in. Let us send a catalog.

BARCO MANUFACTURING COMPANY
1801 Winnemac Avenue, Chicago, Illinois

BARCO



Valves and Joints

O&GJ 9-22 Gray

McCord Force Feed Standard

Buy Lubricators for your compressors, pumps and engines on the basis of tried and proven performances, and you will buy McCords. More McCord Lubricators are in use in the oil fields than all the other makes combined. This preference is merited by McCord Lubricator dependability, accessibility and economy.

McCord Dependable Lubricators keep operating costs at a minimum and insure uninterrupted production.

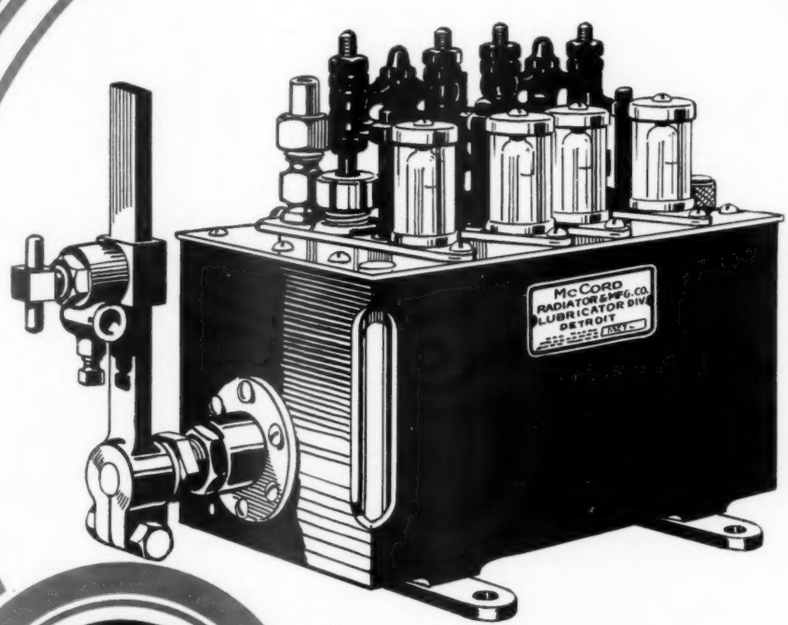
Specify McCord Lubricators on new purchases and order them for your present equipment.

Distributed by THE NATIONAL SUPPLY CO. All Branches

Lubricator Division McCORD RADIATOR & MFG. CO. Detroit, Mich.

McCORD RADIATOR & MFG. CO.
LUBRICATOR DIVISION
Detroit Mich.

Lubricators *the* OIL FIELDS



McCord

DEPENDABILITY
ACCESSABILITY
·ECONOMY·

that specified in paragraph 3-a by more than *25 per cent.

4-b. If the analysis of only one length of pipe or skelp does not conform to the requirements specified, analyses of two additional lengths from the same lot shall be made, each of which shall conform to the requirements specified.

4-c. Drillings for analyses shall be taken from several points around each length of pipe, or across each length of skelp, selected for test.

4-d. When requested by the purchaser, ladle analyses of each heat of open hearth steel and such analyses as the manufacturer may make of Bessemer steel, shall be furnished by the manufacturer.

SECTION 3
Physical Properties and Tests
Tension Tests

5-a. The material shall conform to the following minimum requirements as to tensile properties:

	STEEL					
	Bessemer	O. H. Welded		Seamless		
	Welded	Class I	Class II (Rephos.)	Grade A	Grade B	Grade C
Tensile strength, lbs. per square inch	50,000	45,000	48,000	48,000	70,000	75,000
Yield point, lbs. per square inch	30,000	25,000	28,000	30,000	40,000	45,000
Elongation in 8-inch, per cent	20	22	20	..	..	..
Elongation in 2-inch, per cent	..	..	..	40	25	20

Wrought Iron

Tensile strength, lbs. per sq. in... 42,000
Yield point, lbs. per sq. in..... 24,000
Elongation in 8-inch, per cent... 12

Open Hearth Iron

Tensile strength, lbs. per sq. in... 45,000
Yield point, lbs. per sq. in..... 25,000
Elongation in 8-inch, per cent... 22

5-b. The yield point shall be determined by the drop of the beam of testing machine, by dividers, or any other approved methods.

Hydrostatic Tests

6-a. Each length of pipe shall be tested at the mill to the hydrostatic pressures specified in the tables appended. (See Tables 1, 2 and 3.) Lap welded pipe shall be struck near both ends, while under pressure, a blow with a 2-pound hammer or its equivalent and the hydrostatic pressure specified shall be maintained for not less than five seconds.

6-b. The test pressures on sizes or weights of lap welded pipe of diameters 2 inches and larger and not listed should not exceed those required by the formula:

$$P = \frac{2St}{D}$$

in which

P equals the pressure in pounds per square inch.

S equals allowable fibre stress 16,000 pounds per square inch maximum and 14,000 pounds per square inch minimum for steel pipe; 14,000 pounds per square inch maximum and 12,500 pounds per square inch in minimum for open hearth iron; and 12,000 pounds per square inch maximum and 10,700 pounds per square inch minimum for wrought iron pipe, but no pressure need exceed 2,500 pounds.

t equals thickness of the wall in inches.

D equals outside diameter in inches.

Flattening Tests

7-a-1. The crop ends cut from each length of steel or open hearth iron lap-welded pipe shall withstand flattening between parallel plates, until the distance between the plates is one-third the outside diameter of the pipe, without cracking or showing any injurious flaws. The tests shall be made with the weld approximately 45 degrees from the point of maximum bend. If any section fails, other pieces from the length may be cut until satisfactory tests are obtained, otherwise the length shall be rejected. Precautions shall be taken so that crop ends can be identified with respect to the length from which they are cut.

7-a-2. At the option of the manufacturer, and unless objected to by the purchaser, this test may be made with the weld on the side, in which case crop ends shall be flattened between parallel plates until the distance between the plates is two-thirds of the outside diameter without opening at weld, or break in material. The crop ends shall then be crushed flat to detect laminated or burnt material.

7-b. The crop ends cut from each length of lap welded wrought iron pipe shall be flattened until broken. The test shall be made with weld approximately 45 degrees from the point of maximum bend. The test piece must show a good weld and the fracture shall have a fibrous appearance. If any section fails to meet these requirements, other pieces from the length may be cut until satisfactory tests are obtained, otherwise the length shall be rejected. Precautions shall be taken so that crop ends can be identified with respect to the length from which they are cut.

7-c. For butt welded steel pipe over 2 inches in diameter, a section of pipe 6 inches long shall be flattened between parallel plates until the distance between the plates is 60 per cent of the outside diameter of the pipe with the weld located 45 degrees from the point of maximum bend, without developing cracks. In the case of butt welded iron pipe over 2 inches in diameter, a section of pipe 6 inches long shall be flattened until broken. The test piece must show a good weld and the fracture shall have a fibrous appearance.

Bend Tests

8. For butt welded steel pipe 2 inches or under in diameter, a sufficient length of pipe shall stand being bent cold through 90 degrees around a cylindrical mandrel, the diameter of which is 12 times the nominal diameter of the pipe, without developing cracks at any portion and without opening the weld. In the case of butt welded iron pipe, the cylindrical mandrel for this test may be 15 times the nominal diameter of the pipe. The weld shall be placed approximately 45 degrees from the inside radius of the axis of bending.

Test Specimens

9-a. Tension test specimens, when the pipe is not pulled in full section, shall consist of strips cut longitudinally from either end of the pipe. They shall not be flattened before testing. The specimens from welded pipe shall be taken from a point approximately 90 degrees from the weld. By agreement between the manufacturer and purchaser, the tensile test specimens for welded pipe may be taken from the skelp.

9-b. All testing shall be done cold.

Number of Tests

10. One of each of the tests specified in Paragraph 5-a may be made on a length in each lot of 400 or less, of each size under 6 inches, and in each lot of 200 or less, of each size 6 inches or over. When taken from the skelp the number of tests shall be determined in the same manner as when taken from the finished pipe. One each of the tests specified in paragraph 7-c and 8 may be made on a length in each lot of 400 or less, of each size.

Retests

11-a. If the results of the physical tests of any lot do not conform to the requirements specified in paragraphs 5-a, 7-c and 8, retests of two additional lengths from the same lot shall be made, each of which shall conform to the requirements specified.

11-b. If any specimen shows defective machining and develops flaws, it may be discarded and another specimen substituted. If the elongation of any tension test specimen is less than that specified and any part of the fracture is outside of the middle third of the gauge length as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

SECTION 4
Standard Weights

12-a. The standard sizes and weights for line pipe are given in tables appended. (See Tables 1, 2 and 3.)

Permissible Variations

12-b. The weight of any length of pipe listed in Tables 1 and 2 shall not vary more than 3½ per cent under or 10 per cent over that specified. The weight of any length of pipe listed in Table 3 shall not vary more than 5 per cent under or 10 per cent over that specified. Unless otherwise agreed upon, pipe sizes 4 inches and larger shall be weighed separately. Sizes smaller than 4 inches may be weighed in convenient lots. In the case of threaded line pipe, the pipe will be weighed with coupling screwed on but with thread protectors removed.

Lengths

13-a. Unless otherwise specified, threaded line pipe in standard weights and thicknesses, as listed in Table 1, shall be furnished with not over 5 per cent under 18 feet in length, with a minimum of 16 feet for the length of any joint. On this class of goods, jointers (two short lengths connected by a coupling), the minimum length of the shorter piece to be 5 feet, may be shipped to a maximum of 5 per cent of the order.

13-b. Unless otherwise specified, plain end line pipe as listed in Table 2 shall have an average length of not less than 17 feet 6 inches and no length shorter than 9 feet may be shipped. Plain end pipe as listed in Table 3 in sizes up to 20 inches outside diameter shall have an average length of not less than 17 feet and no length shorter than 9 feet may be shipped. On sizes larger than 20 inches outside diameter the minimum and average lengths shall be furnished as agreed upon between purchaser and manufacturer at time of purchase.

SECTION 5
Workmanship and Finish

14-a. All skelp entering into lap welded line pipe must be scarfed.

14-b. For pipe 1½ inches or under in nominal inside diameter, the outside diameter at any point shall not vary more than one-sixty-fourth inch over nor more than one-thirty-second inch under the standard size. For pipe 2 inches or over in nominal inside diameter, the outside diameter shall not vary more than 1 per cent over or under the standard size. The wall thickness of welded and seamless pipe shall not be more than 12½ per cent under the nominal wall thickness at any point.

14-c. The finished pipe shall be reasonably straight and free from injurious defects, such as burnt material, bad welds, sand pits, ball cuts, pits, cinder spots, liquor marks, blisters, slivers, and laminations. Seamless pipe shall also be free from injurious seams. When the depth of sand pits, liquor marks and cinder spots is in excess of 12½ per cent of the nominal wall thickness they shall be considered injurious defects; welding of such defects will be permitted at the discretion of the manufacturer, provided the depth of such holes does not exceed 33⅓ per cent of the nominal wall thickness, and provided the holes being repaired are not closer than 1 inch to the lap weld. It should be understood that hydrostatic tests made on pipe repaired in this manner shall be made on the finished pipe. The threading on the pipe must be free from tears, shoulders, cuts or any defects which may break the continuity of the thread.

Ends

15. Unless otherwise specified, pipe shall conform to the following regular practice:

15-a-1. Each end of threaded pipe shall be reamed to remove all burrs. Plain end pipe for use with the Dresser or Dayton type coupling shall be reamed both inside and outside just sufficiently to remove any burrs. All such pipe shall be sufficiently free from indentations, projections or roll marks for a distance of 8 inches from the end of the pipe to make a tight joint with the rubber gasket type of coupling. All plain end line pipe intended for Dresser or Dayton type joints, or for welding sizes 10¾ inches outside diameter and smaller, shall not be more than one-sixty-fourth inch smaller than the nominal outside diameter for a distance of 8 inches from the end of the pipe and shall permit the passing for a distance of 8 inches of a ring gauge which has a bore one-sixteenth inch larger than the nominal outside diameter of the pipe. Sizes larger than 10¾ inches outside diameter shall not be more than one-thirty-second inch smaller than the nominal outside diameter for a distance of 8 inches from the end of the pipe and shall permit the passing for a distance of 8 inches of a ring gauge which has a bore three-thirty-seconds inch larger than the nominal outside diameter of the pipe.

15-a-2. Plain end pipe for welding, unless otherwise specified, shall be beveled to an angle of 45 degrees, and with an average width of flat at the end of the pipe of one-sixteenth inch, ± one-thirty-second inch. This class of material shall be reamed inside at the ends sufficiently to remove all burrs or shall be beveled to an angle of 45 degrees. Where material is ordered beveled to any other than a 45 degree angle, it shall be understood that the angle is to be measured from a line drawn perpendicular to the axis of the pipe. This means that a greater amount of material is removed with a 60-degree angle than with a 45-degree angle.

Threads

15-b. When threaded line pipe is ordered, as specified in Table 1, the threads shall be in accordance with Table 1-A and cut so as to make a tight joint when the pipe is tested at the mill to the specified internal hydrostatic pressure. The variation from the standard, when tested with the standard working gauge, shall not exceed a maximum of one and one-half turns either way.

15-c. Threads in couplings and on pipe shall be so nearly alike in form and size, and so well finished, that joints can be screwed together with suitable lubricant, far enough to make a tight joint, and unscrewed four times without injury to the threads. At the discretion of the inspector, where the purchaser is represented by an inspector, one joint of sizes 2 inches and larger may be so tested out of a lot of 100 or more after joints have been made up in the coupling screwing machine.

15-d. Pipe shall not be rounded out by hammering in order to get a full thread. Pipe having more than six black threads along the taper (not including the vanishing threads) will be rejected. Black threads should not be confused with imperfect threads such as torn, shaved or broken threads.

15-e-1. Each manufacturer of A.P.I. threaded line pipe shall provide himself with plug and ring reference gauges which have been manufactured in accordance with the gauge tables appended. (See Table 1-B) except that gauges may be used which have been manufactured in accordance with the American Engineering Standards for pipe threads as outlined in Bulletin No. 3—1919, in which case the additional length of thread specified for line pipe will project through the American Engineering Standards ring gauge; provided that such existing gauges are certified by the Bureau of Standards, Washington, D. C., to be in accordance with gauge tables appended, before their use is authorized under this specification. New gauges should be made in exact accordance with the information given in Table 1-B. All reference gauges are to be checked and certified by the Bureau of Standards at Washington. Each certificate shall identify a particular gauge by a serial number, and the date of certificate shall be marked on the gauge. The certificate shall state any errors of pitch diameter, lead, taper, or angle of thread. The reference gauge will be a taper threaded plug gauge. The errors on new reference gauges shall not exceed the limits contained in gauge specifications appended.

15-e-2. A worn gauge which is within these limits except for pitch diameter, which varies from the table by not more than one turn may be used provided such error is marked on the gauge and proper allowance made for such error when using gauge. Form of thread for gauges, etc., shall conform to the practice specified in gauge Table 1-B appended. Gauging shall be done to conform with A.P.I. pipe gauging practice.

Taper Tests

15-f. The taper of threads on both pipe and couplings shall be tested by approved methods at intervals sufficient to

*Subject to revision upon report of special investigating sub-committee appointed to review this section.

You will eventually use the HALLIBURTON Sand Tester— why not now?

Mail Coupon *for* Detailed Information

ERLE P. HALLIBURTON, Duncan, Oklahoma

Without obligation, please send me full details of the Halliburton Sand Tester, together with prices.

Name ---------- Street ----------

City ---------- State ----------

insure that taps and does are in proper adjustment.

The variations in taper shall not exceed the following limits:

Maximum taper thirteen-sixteenths inch.

Minimum taper twenty-three-thirty-seconds inch.

Thread Protectors

15-g. Solid tapped rings or split couplings, or other protectors to be approved by the American Petroleum Institute, shall be provided as thread protectors on all sizes 2 inches and larger, and shall be made and finished so as to prevent water from accumulating around the threads on the pipe. The thickness of the protectors shall be approximately that of the pipe on which they are used, unless of such form and make as to give equal or greater protection to the end of the pipe and to the thread. On sizes under 2 inches for export shipment, the ends shall be wrapped with a suitable fabric protection.

Couplings

15-h. Each length of threaded pipe shall be provided with one coupling, having clean cut threads of such a pitch diameter as to give a tight joint. Couplings may be made of wrought iron or steel, seamless or welded, and shall be free from blisters, pits, cinder marks and any other injurious defects that would impair the efficiency of the coupling and break the continuity of the thread. When couplings are made of steel, sizes 2 inches and larger shall be electroplated on the threads, heat treated or treated by some other method of manufacture which will minimize the chance of galling.

15-i. No tapers of couplings to be secured by expanding.

15-j. When couplings are screwed on at the mill a high grade lubricant shall be applied to coupling and pipe threads before making up the joint; and to prevent rust, all exposed threads, unless otherwise specified, shall be thoroughly greased.

Alignment Test

15-k. The couplings shall be tapped concentric so that the axes of the threads of the two ends are closely in line. Couplings on sizes 6 inches and larger shall be tested for alignment by screwing onto a threaded piece carefully centered in a lathe; in the outer edge of coupling is screwed a lathe turned piece which will give a measured length of about 1 foot on which the alignment of the coupling threads may be determined by an alignment indicator when rotated in the lathe. Other approved means of measuring alignment may be used. Couplings shall be in line within three-fourths inch in a length of 20 feet. One coupling may be tested from each lot of 100 or less, but the question of whether or not this test will be made shall be left to the discretion of the inspector where the purchaser is represented by an inspector. In case this coupling fails, two more couplings may be taken from the same lot, each of which must be within the alignment specified, otherwise the lot shall be rejected. In any case the manufacturer may test rejected couplings individually if desired.

Marking

16. The length, the test pressure in pounds, and class of material shall be stenciled on each length of pipe, sizes 2 inches and larger, and on sizes 4 inches and larger, except dipped or coated pipe, the weight of each length shall be stenciled. Approved abbreviations may be used. The A.P.I. monogram shall be stamped with steel stencil on each joint, sizes 2 inches and larger, 1 foot from couplings on the shop end of threaded line pipe and about 1 foot from either end on plain end line pipe. The A.P.I. monogram shall also be stamped with steel stencil on all couplings for pipe sizes 2 inches and larger. The size of monogram to be one-fourth inch high on all sizes of pipe; three-eighths inch high on couplings for pipe sizes from 2 inches to 6 inches, inclusive, and one-half inch high on couplings for pipe sizes over 6 inches. (The upper and lower cross bar on the letter "I" in the A.P.I. monogram may be omitted.) On pipe sizes smaller than 2 inches, which are regularly bundled, the A.P.I. monogram will not be stamped on either the pipe or the couplings but will be stamped on the metal measurement tag which is attached to each bundle.

All pipe manufactured in accordance with these specifications shall be marked, by stamping or rolling, with the manufacturer's private identifying mark. On bundled pipe this mark may be stamped on the metal tag.

TABLE 1-A—THREADS—AMERICAN PETROLEUM INSTITUTE LINE PIPE

See Figure 1.

All dimensions in inches at 68 degrees Fahrenheit.

Pipe				Threads									
Size	External Diameter "O. D."	Weight per foot Comp.	No. per inch "B"	Taper, inches per foot "b"	Length of Perfect "E"	Number of Perfect	Effective Length "p"	Total Length "Q"	Ht. of Thread Truncated "h"	Diameter of Pipe at Root of Threads "L"	Diameter of Pipe at Top of Threads "L'"	End of pipe to Center of Coupling Made up. "J"	Distance End of Coupling Beyond Last Scratch Made up: "R. R."	Stand-off of Coupling at Hand-tight fit. "A"
⅛	.405		27	¾	.18978	5.12400	.26385	.37496	.02963	.33388	.39314	.187	.000	.....
¼	.540		18	¾	.29067	5.23200	.40178	.56844	.04444	.43294	.52183	.119	.000	.....
⅜	.675		18	¾	.40778	7.34000	.51889	.68556	.04444	.56063	.64951	.126	.000	.....
½	.840		14	¾	.42386	5.93400	.56671	.78100	.05714	.69922	.81351	.156	.000	.....
¾	1.050		14	¾	.54571	7.64000	.68857	.90285	.05714	.90161	1.01589	.159	.000	.....
1	1.315		11½	¾	.56522	6.50000	.73913	1.00000	.06957	1.14054	1.27967	.187	.000	.....
1¼	1.660		11½	¾	.70678	8.12800	.88070	1.14157	.06957	1.47670	1.61583	.295	.000	.....
1½	1.900		11½	¾	.72348	8.32000	.89739	1.15826	.06957	1.71565	1.85478	.279	.000	.....
2	2.375		11½	¾	.93043	10.70000	1.10435	1.36522	.06957	2.17772	2.31685	.447	.000	.....
2½	2.875		8	¾	.95000	7.60000	1.20000	1.57500	.10000	2.61563	2.81563	.487	.000	.....
3	3.500		8	¾	.95000	7.60000	1.20000	1.57500	.10000	3.24063	3.44063	.487	.000	.....
3½	4.000		8	¾	1.17500	9.40000	1.42500	1.80000	.10000	3.72656	3.92657	.512	.000	.....
4	4.500		8	¾	1.17500	9.40000	1.42500	1.80000	.10000	4.22656	4.42656	.512	.000	.....
5	5.563		8	¾	1.40630	11.25040	1.65630	2.03130	.10000	5.27511	5.47511	.531	.000	.....
6	6.625		8	¾	1.51250	12.10000	1.76250	2.13750	.10000	6.33047	6.53047	.424	.000	.....
8	8.625	All	8	¾	1.71250	13.70000	1.96250	2.33750	.10000	8.31797	8.51797	.724	.000	.....
10	10.750	All	8	¾	1.92500	15.40000	2.17500	2.55000	.10000	10.42969	10.62969	.762	.000	.....
12	12.750	All	8	¾	2.12500	17.00000	2.37500	2.75000	.10000	12.41719	12.61719	.562	.000	.....
14 O.D.	14.000		8	¾	2.25000	18.00000	2.50000	2.87500	.10000	13.65938	13.85938	.687	.000	.....
15 O.D.	15.000		8	¾	2.35000	18.80000	2.60000	2.97500	.10000	14.65313	14.85313	.587	.000	.....
16 O.D.	16.000		8	¾	2.45000	19.60000	2.70000	3.07500	.10000	15.64688	15.84688	.487	.000	.....
17 O.D.	17.000		8	¾	2.45000	19.60000	2.70000	3.07500	.10000	16.64688	16.84688	.487	.000	.....
18 O.D.	18.000		8	¾	2.45000	19.60000	2.70000	3.07500	.10000	17.64688	17.84688	.487	.000	.....
20 O.D.	20.000		8	¾	2.60000	20.80000	2.85000	3.22500	.10000	19.63750	19.83750	.587	.000	.....

TABLE 1-B—A. P. I. LINE PIPE GAUGES

See Figure 2. All dimensions in inches at 68 degrees Fahrenheit.

Nominal Size	Outside Diameter "O.D."	No. of Threads per inch "B"	Included Taper Inches per foot "b"	Pitch Dia. at Gauge Point "C"	Major Dia. at Gauge Point "D"	Dist. from Gauge Point to Last Scratch "g"	Width ofNotch "U"	Height of Thread (Truncated) "h"	Pitch "P"	Standoff "S"
⅛	.405	27	¾	.37537	.40004	.185	.111±.100	.02467	.0370370	.185±.10
¼	.540	18	¾	.49556	.53256	.278	.167±.100	.03700	.0555555	.185±.10
⅜	.675	18	¾	.63056	.66756	.278	.167±.100	.03700	.0555555	.185±.10
½	.840	14	¾	.78286	.83043	.357	.214±.100	.04757	.0714285	.185±.10
¾	1.050	14	¾	.99286	1.04043	.357	.214±.100	.04757	.0714285	.185±.10
1	1.315	11½	¾	1.24543	1.30335	.435	.261±.100	.05792	.0869565	.185±.10
1¼	1.660	11½	¾	1.59043	1.64835	.435	.261±.100	.05792	.0869565	.185±.10
1½	1.900	11½	¾	1.83043	1.88835	.435	.261±.100	.05792	.0869565	.185±.10
2	2.375	11½	¾	2.30543	2.36335	.435	.261±.100	.05792	.0869565	.185±.10
2½	2.875	8	¾	2.77500	2.85825	.625	.375±.100	.08325	.1250000	.375±.10
3	3.500	8	¾	3.40000	3.48325	.625	.375±.100	.08325	.1250000	.375±.10
3½	4.000	8	¾	3.90000	3.98325	.625	.375±.100	.08325	.1250000	.375±.10
4	4.500	8	¾	4.40000	4.48325	.625	.375±.100	.08325	.1250000	.375±.10
5	5.563	8	¾	5.46300	5.54625	.625	.375±.100	.08325	.1250000	.375±.10
6	6.625	8	¾	6.52500	6.60825	.625	.375±.100	.08325	.1250000	.375±.10
8	8.625	8	¾	8.52500	8.60825	.625	.375±.100	.08325	.1250000	.375±.10
10	10.750	8	¾	10.65000	10.73325	.625	.375±.100	.08325	.1250000	.375±.10
12	12.750	8	¾	12.65000	12.73325	.625	.375±.100	.08325	.1250000	.375±.10
14 O.D.	14.000	8	¾	13.90000	13.98325	.625	.375±.100	.08325	.1250000	.375±.10
15 O.D.	15.000	8	¾	14.90000	14.98325	.625	.375±.100	.08325	.1250000	.375±.10
16 O.D.	16.000	8	¾	15.90000	15.98325	.625	.375±.100	.08325	.1250000	.375±.10
17 O.D.	17.000	8	¾	16.90000	16.98325	.625	.375±.100	.08325	.1250000	.375±.10
18 O.D.	18.000	8	¾	17.90000	17.98325	.625	.375±.100	.08325	.1250000	.375±.10
20 O.D.	20.000	8	¾	19.90000	19.98325	.625	.375±.100	.08325	.1250000	.375±.10

TABLE 1

A. P. I. LINE PIPE (THREADED)

See Figure 1.

All dimensions in inches at 68 degrees Fahrenheit.

Diameters			Weight per foot			Threads per inch	Test Pressure					Coupling					Working Pressure Lap-welded Steel Pipe		
							Steel			O. H. Iron Lap Weld	Wrt. Iron Lap Weld						Fiber Stress 12500 Lbs. Sq. In. Safety Factor of 4	Fiber Stress 10000 Lbs. Sq. In. Safety Factor of 5	Fiber Stress 8333 Lbs. Sq. In. Safety Factor of 6†
Nominal Size	External "OD"	Internal "ID"	Thickness "K"	Plain Ends	Threads and Couplings	"B"	Butt* Weld	Lap Weld	Seamless			Length "N"	Outside Diam. "CD"	Depth Recess "q"	Diam. of Recess "Q"	Calc. Weight of Coupling			
⅛	.405	.269	.068	.244	.250	27	700	....	....	....	....	1⅛	.582	1/16	.467	.045	....	....	....
¼	.540	.364	.088	.424	.430	18	700	....	....	....	....	1⅜	.724	⅛	.602	.073	....	....	....
⅜	.675	.493	.091	.567	.576	18	700	....	....	....	....	1⅝	.898	⅛	.737	.133	....	....	....
½	.840	.622	.109	.850	.860	14	700	....	....	....	....	1⅞	1.085	⅛	.902	.218	....	....	....
¾	1.050	.824	.113	1.130	1.140	14	700	....	....	....	....	2⅛	1.316	⅛	1.112	.334	....	....	....
1	1.315	1.049	.133	1.678	1.700	11½	700	....	....	....	....	2⅜	1.575	⅛	1.377	.470	....	....	....
1¼	1.660	1.380	.140	2.272	2.300	11½	1200	2500	2500	2200	1900	2⅞	2.054	¼	1.722	1.036	2108	1688	1405
1½	1.900	1.610	.145	2.717	2.750	11½	1200	2300	2500	2000	1.700	2⅞	2.294	¼	1.962	1.170	1907	1526	1271
2	2.375	2.067	.154	3.652	3.750	11½	1200	2000	2500	1700	1400	3⅛	2.841	¼	2.469	2.174	1621	1296	1080
2½	2.875	2.469	.203	5.793	5.900	8	1200	2100	2500	1800	1600	4⅛	3.389	¼	2.969	3.433	1765	1412	1176
3	3.500	3.068	.216	7.575	7.700	8	1200	1900	2200	1600	1400	4⅛	4.014	¼	3.594	4.131	1542	1234	1028
3½	4.000	3.548	.226	9.109	9.250	8	....	1700	2100	1500	1300	4⅝	4.628	⅜	4.094	6.289	1412	1130	941
4	4.500	4.026	.237	10.790	11.000	8	....	1600	2000	1400	1200	4⅝	5.232	⅜	4.594	8.155	1316	1053	877
5	5.563	5.047	.258	14.617	15.000	8	....	1500	1800	1200	1000	5⅛	6.420	⅜	5.656	12.870	1159	927	772
6	6.625	6.065	.280	18.974	19.450	8	....	1500	1600	1100	950	5⅛	7.482	⅜	6.719	15.176	1056	845	704
8	8.625	8.071	.277	24.696	25.550	8	....	1000	1200	850	700	6⅛	9.596	⅜	8.719	26.626	802	642	535
8	8.625	7.981	.322	28.554	29.350	8	....	1200	1400	1000	800	6⅛	9.596	⅜	8.719	26.626	933	746	622
10	10.750	10.192	.279	31.201	32.750	8	....	800	1000	700	600	6⅝	11.958	⅜	10.844	44.156	648	519	432
10	10.750	10.136	.307	34.240	35.750	8	....	900	1100	750	650	6⅝	11.958	⅜	10.844	44.156	713	571	475
10	10.750	10.020	.365	40.483	41.850	8	....	1000	1300	900	800	6⅝	11.958	⅜	10.844	44.156	848	679	565
12	12.750	12.090	.330	43.773	45.450	8	....	800	1000	700	600	6⅝	13.958	⅜	12.844	51.991	647	517	431
12	12.750	12.000	.375	49.562	51.150	8	....	900	1100	750	650	6⅝	13.958	⅜	12.844	51.991	735	588	490
14 OD	14.000	13.250	.375	54.568	57.000	8	....	800	....	700	600	7⅛	15.446	⅜	14.094	72.280	669	535	446
15 OD	15.000	14.250	.375	58.573	61.150	8	....	750	....	650	550	7⅛	16.446	⅜	15.094	77.221	625	500	416
16 OD	16.000	15.250	.375	62.579	65.300	8	....	750	....	600	500	7⅛	17.446	⅜	16.094	82.162	585	468	390
17 OD	17.000	16.214	.393	69.704	73.200	8	....	750	....	600	500	7⅛	18.683	⅜	17.094	99.628	577	462	385
18 OD	18.000	17.182	.409	76.840	81.200	8	....	700	....	600	500	7⅛	19.921	⅜	18.094	119.145	568	454	378
20 OD	20.000	19.182	.409	85.577	90.000	8	....	650	....	550	450	7⅝	21.706	⅜	20.094	127.850	511	409	340

* Standard test pressures for butt weld pipe are not figured by formula.

† To obtain the working pressure for other factors of safety, multiply the pressure shown in this column by 6 and divide by the safety factor desired.

Costs *are* cut

when you use
TRU-LAY Brand Wire Rope

Years of the hardest field service have proved that "Crescent Brand" and Tru-Lay Brand Wire Rope last longer—cost less in service.

An added plus of value is built into Tru-Lay Brand. The wires aren't placed under torsional strain. Instead each wire—each strand—is preformed to the exact shape required and laid in place. Uniform distribution of load stresses is assured.

Users will tell you Tru-Lay Brand Wire Rope gives greatly increased service. What is more, it is easier to handle, cut and splice. It resists kinking and unstranding—and it far outlasts ordinary rope, for rotary casing lines, sand lines, cable tool casing lines, sucker rod lines, tubing lines and coarse laid cable tool lines.

Prove these rope facts for yourself. Your name and address will bring a sample. You can test it in your work in your own way. Start your savings now.

AMERICAN CABLE COMPANY, *Inc.*
105 Hudson Street, New York City
District Offices: Chicago Cleveland Pittsburgh Philadelphia Tulsa
An Associate Company of the American Chain Company, Incorporated
The Dominion Wire Rope Company, *Limited*, Montreal, Sole Canadian Licensed Manufacturers

PREFORMED WIRE ROPE

TRADE **TRU-LAY** MARK

[REG. U. S. PAT. OFF.]

Sold in Field Stores by:

Jarecki Manufacturing Co. and Branches, Pittsburgh, Pa.
Jarecki Manufacturing Co. and Branches, St. Louis, Mo.
Mid-Continent Supply Co., Fort Worth, Texas
Marion Machine, Foundry and Supply Co. and Branches, Marion, Ind.
Grinnell Company of the Pacific and Branches, Los Angeles, Calif.

SECTION 6
Inspection and Rejection
Inspection

17-a. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacture of the pipe ordered. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the pipe is being furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

17-b. Where inspector representing purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

Rejection

18. Material which shows injurious defects subsequent to acceptance at manufacturer's works, or which proves defective when properly applied in service, may be rejected, and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A.P.I. pipe, except where said pipe fails to comply with the weight specifications alone, in which case it may be sold under weight specifications with which it does comply. When pipe stamped with the A.P.I. monogram is rejected, a cancelling stencil, one-half inch square, shall be applied to such monogram in the following manner: the cancelling stencil shall be applied twice, first with the lines of the stencil parallel to the axis of the pipe, the stencil then turned 90 degrees, and applied the second time.

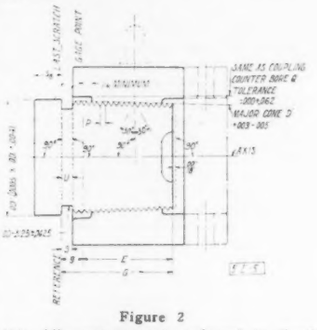


Figure 2

(a) All measurements referred to shoulder marked "last scratch."

(b) The small end of gauges are not measuring planes, but are finished square with axis to assist certification.

(c) All dimensions are in inches Std. at 68 degrees Fahrenheit.

(d) The lengths of the gauges from the last scratch are unimportant within the tolerances shown.

(e) The length of the threads in the ring gauge should not be less than ("E" minus 1½ pitches.)

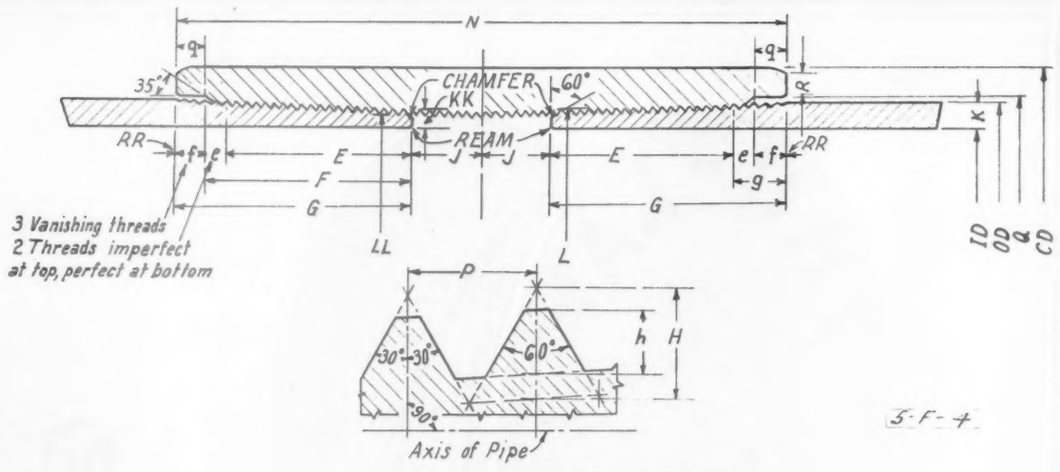
(f) The ring gauge may be extended as shown to provide sockets for make-up bar.

(g) The crests of the threads on gauges shall be truncated as indicated in column "h" in gauge table. The roots of the threads on gauges shall be cut to a sharp V, or when ground, shall be undercut to prevent the gauge from bearing on crest or root of the thread on the product.

(h) See specifications on gauges for permissible tolerances, etc.

GAUGING PRODUCTS WITH A.P.I. TUBULAR GOODS

1. For the gauging of products used with A.P.I. Tubular Goods other than standard couplings, it may be desirable to represent the last scratch of thread on the master plug by a male step. A permissible method is shown in Figure 4.



ENLARGED SECTION OF THREAD

Figure 1

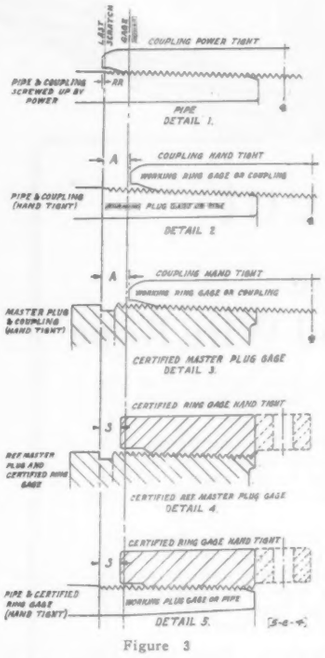


Figure 3

American Practice for Gauging of A.P.I. Tubular Goods.

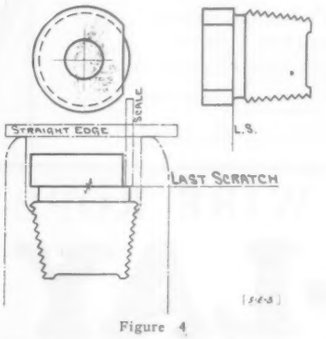


Figure 4

External Diameter	Thickness	Weight per foot Plain Ends	Test Pressures: Steel Lap Weld	O. H. Iron Lap Weld	Wrought Iron Lap Weld	Working Pressures Lapweld Steel Pipe: Fiber Stress 12,500 lbs. sq. inch Safety Factor of 4	Fiber Stress 10,000 lbs. sq. inch Safety Fac.or of 5	Fiber Stress 8,333 lbs. sq. inch Safety Factor of 6†
3-1/2	.216	7.575	1900	1600	1400	1542	1234	1028
	.241	8.388	2000	1800	1500	1721	1377	1147
	.254	8.805	2200	1900	1600	1814	1451	1209
	.289	9.910	2500	2200	1800	2064	1651	1376
	.300	10.252	2500	2300	1900	2142	1714	1428
4	.226	9.109	1700	1500	1300	1412	1130	941
	.318	12.505	2500	2100	1800	1987	1590	1325
4-1/2	.237	10.790	1600	1400	1200	1316	1053	877
	.255	11.561	1800	1500	1300	1416	1133	944
	.271	12.240	1800	1600	1400	1505	1204	1003
	.3125	13.975	2000	1800	1600	1736	1389	1157
	.337	14.983	2200	2000	1700	1872	1497	1248
5-9/16	.258	14.617	1500	1200	1000	1159	927	772
	.304	17.074	1600	1400	1200	1366	1092	910
	.3125	17.523	1700	1500	1300	1404	1123	936
	.375	20.778	2000	1800	1500	1685	1348	1123
6-5/8	.280	18.974	1500	1100	950	1056	845	704
	.288	19.491	1500	1100	1000	1086	869	724
	.292	19.750	1500	1200	1000	1101	881	734
	.343	23.012	1600	1400	1200	1294	1035	862
	.352	23.582	1600	1400	1200	1328	1062	885
	.385	25.658	1700	1500	1300	1452	1162	968
	.417	27.648	1900	1700	1400	1573	1258	1049
	.432	28.573	2000	1800	1500	1630	1304	1086
8-5/8	.277	24.696	1000	850	700	802	642	535
	.304	27.016	1000	950	800	881	704	587
	.311	27.615	1200	950	800	901	721	600
	.322	28.554	1200	1000	800	933	746	622
	.340	30.084	1200	1000	900	985	788	657
	.362	31.101	1200	1000	900	1020	816	680
	.375	33.041	1300	1100	1000	1086	869	724
	.400	35.137	1400	1200	1000	1159	927	772
	.425	37.220	1500	1300	1100	1231	985	821
	.4375	38.256	1500	1300	1200	1268	1014	845
	.487	42.327	1700	1500	1300	1411	1129	941
	.500	43.388	1700	1500	1300	1449	1159	966
10-3/4	.279	31.201	800	700	600	648	519	432
	.307	34.240	900	750	650	713	571	475
	.348	38.661	1000	850	750	809	647	539
	.365	40.482	1000	900	800	848	679	565
	.395	43.684	1100	1000	800	918	734	612
	.400	44.215	1100	1000	800	930	744	620
	.424	46.760	1200	1100	900	986	788	657
	.450	49.502	1300	1100	950	1046	837	697
	.482	52.962	1300	1200	1000	1123	898	748
	.495	54.214	1400	1200	1000	1151	920	767
	.500	54.735	1400	1200	1000	1162	930	775
12-3/4	.330	43.773	800	700	600	647	517	431
	.34375	45.547	800	700	600	674	539	449
	.375	49.562	900	750	650	735	588	490
	.500	65.415	1100	1050	900	980	784	653
14	.375	54.568	800	700	600	669	535	446
	.40625	58.980	900	750	650	725	580	483
	.4375	63.371	900	800	700	781	625	520
	.46875	67.741	1000	900	750	837	669	558
15	.375	58.573	750	650	550	625	500	416
	.40625	63.319	800	700	600	677	541	451
	.4375	68.044	900	750	650	729	583	486
	.46875	72.748	900	800	700	781	625	520
	.500	77.431	1000	900	750	833	666	555
	.5625	86.734	1100	1000	850	937	750	625
16	.375	62.579	750	600	500	585	468	390
	.401	66.806	800	650	550	626	501	417
	.4375	72.716	900	700	600	683	546	455
	.495	81.969	1000	800	700	773	618	515
	.500	82.771	1000	800	700	781	625	520
17"	.393	69.764	750	600	500	577	462	385
	.40625	71.997	750	600	500	597	477	398
	.4375	77.389	800	650	550	643	514	428
	.46875	82.760	850	700	600	689	551	459
	.500	88.111	900	750	650	735	588	490
	.5625	98.749	1000	850	750	827	661	551
18"	.409	76.840	700	600	500	568	454	378
	.4375	82.061	700	650	550	607	486	405
	.46875	87.767	750	700	600	651	520	434
	.500	93.451	800	750	650	694	555	462
	.5625	104.757	950	800	700	781	625	520
20"	.409	85.577	650	550	450	511	409	340
	.4375	91.407	650	550	500	546	437	364
	.500	104.131	750	650	550	625	500	416

†To obtain the working pressure for other factors of safety, multiply the pressure shown in this column by 6 and divide by the safety fac.or desired.

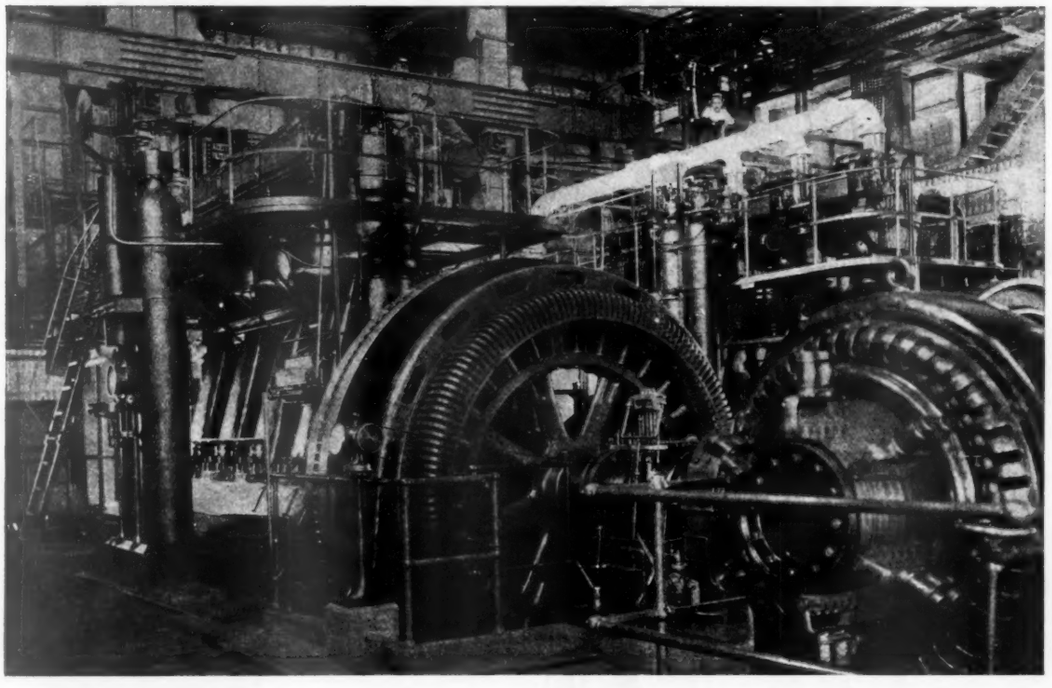
TABLE 2—A.P.I. OUTSIDE DIAMETER PLAIN END LINE PIPE
All dimensions in inches at 68 degrees Fahrenheit.

TABLE 3—A.P.I. OUTSIDE DIAMETER PLAIN END PIPE LINE PIPE (LIGHT WEIGHT)

External Diameter	Thickness	Weight per foot Plain Ends	Test Pressures: Steel Lap Weld	O. H. Iron Lap Weld	Wrought Iron Lap Weld	Working Pressures Lapweld Steel Pipe: Fiber Stress 12,500 lbs. sq. inch Safety Factor of 4	Fiber Stress 10,000 lbs. sq. inch Safety Fac.or of 5	Fiber Stress 8,333 lbs. sq. inch Safety Factor of 6†
3-1/2	.125	4.505	1100	900	800	892	714	595
	.1875	6.633	1600	1400	1200	1339	1071	893
4	.134	5.532	1000	900	750	837	670	558
	.1875	7.634	1400	1200	1100	1171	937	781

(Continued on Page 315)

Eight years of tropical service under discouraging conditions—performance entirely satisfactory



THIS 500-hp. McIntosh & Seymour Diesel Engine, in the power, lighting and street railway plant of Guayaquil, Ecuador, operates on oil transported from a distance, is housed in a building specially constructed to make outside sun heat bearable, is in a district where good labor is a rarity, and for cylinder cooling water has to depend upon such muddy saline water, that only indirect cooling is permissible. In spite of all these handicaps, this unit has not only given uninterrupted satisfactory service, but the low operating cost has contributed to the abandonment of the partial steam power formerly used in the plant.

Other McIntosh & Seymour stationary units are giving equally satisfactory service in Cuba, in Mexico, and in Alaska, and marine type McIntosh & Seymour Diesel Engines are constantly driving big motorships to all corners of the globe.

These installations are far away from substantial repair facilities, but are thoroughly reliable and making big savings for their owners. Isn't it reasonable that McIntosh & Seymour Diesel Engines should be even more desirable in pipe-line pumping stations because within the reach of lower priced fuel and better attendance personnel and with the builder's plant and Engineers quickly available for any necessary service? At any rate, the owners of many of the largest pumping stations in the country have expressed their complete satisfaction by installing additional McIntosh & Seymour units after long experience with earlier McIntosh & Seymour-powered stations.

If you want ample, dependable, economical power either as an addition to present facilities or to replace uncertain high-cost and inadequate steam power, let our Engineers tell you more about Diesel benefits.

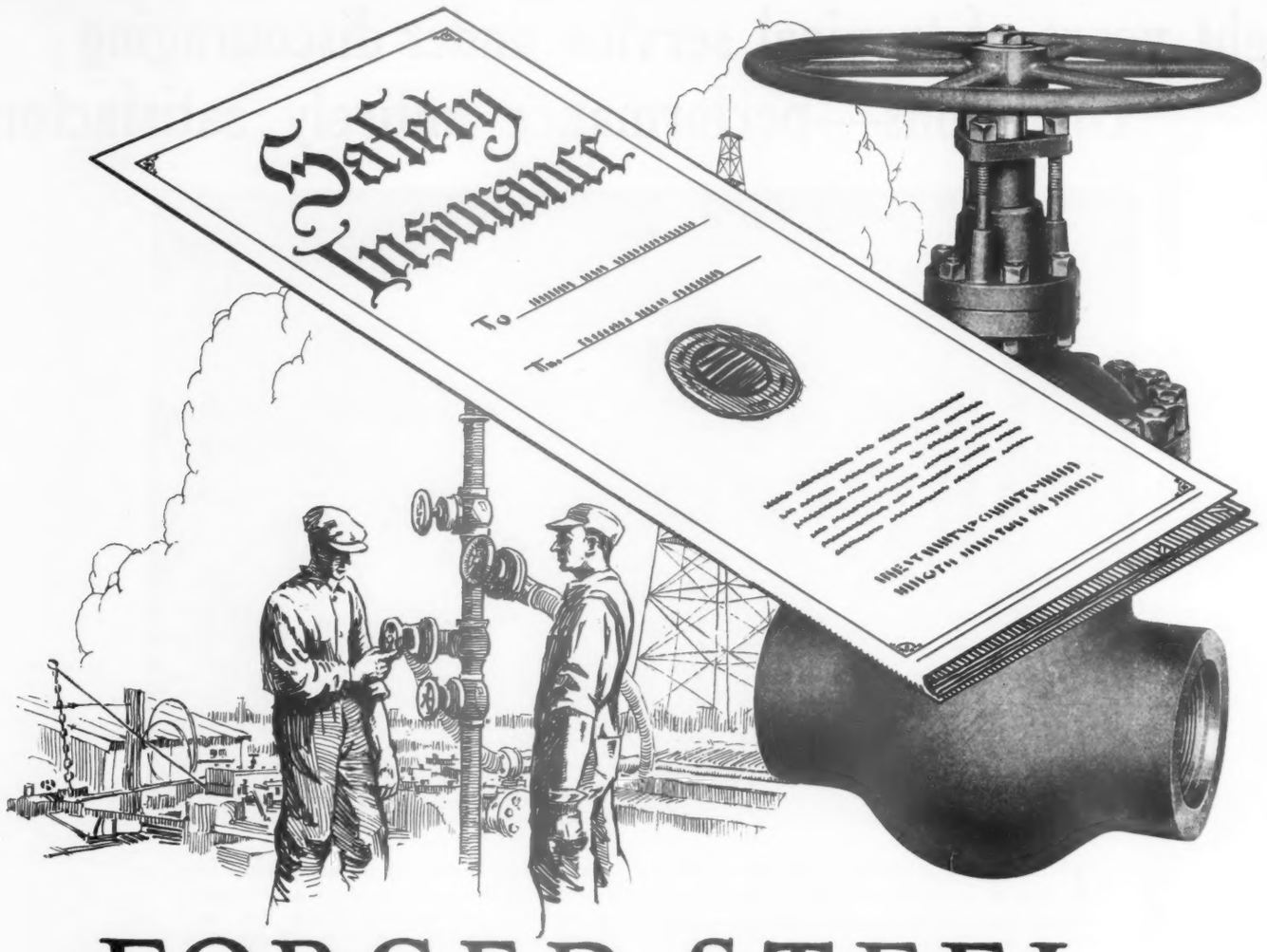
BY INVITATION MEMBER OF

McINTOSH & SEYMOUR
CORPORATION

Main Offices and Works: Auburn, N. Y.

New York City, 149 Broadway | Kansas City, Mo., 1016 Baltimore Ave. | Jacksonville, Fla., 412 Bisbee Bldg. | Houston, Tex., 219 Humble Bldg. | San Francisco, 815 Sheldon Bldg.

McINTOSH & SEYMOUR DIESEL ENGINES



FORGED STEEL
affords your men protection

ANYBODY experienced with the conditions of high pressure fields knows the hazards of their working conditions. It behooves the operator to protect the lives of his men and control of well as far as possible.

This can be done best in the Gate Valves by using the new Darling Forged Steel Valve. It is the strongest valve that can be made, built for working pressures up to 3000 lbs. The very nature of forged steel eliminates the defects which may lie hidden until the unexpected emergency arises. The Darling Forged Steel Valve is ideal for Well Control, Flow Lines, Pipe Lines and any other places of hazardous control.

Made in Screwed Ends, Flanged Ends and Flanged Ends with Companion Flanges bolted on.

DARLING VALVE & MANUFACTURING COMPANY
Williamsport, Pa.

New York Chicago Oklahoma City Houston

Mid-Continent Distributors:

Frick-Reid Supply Co. Atlas Supply Co.
International Supply Co. Petroleum Supply Co.

California Distributor:

Petroleum Equipment Co., Los Angeles

DARLING
GATE VALVES

OIL COUNTRY TUBULAR GOODS

(Continued from Page 252)

TABLE 4—A.P.I. CASING GAUGES

See Figure 3

See Tables 2 and 3 for Lengths of Threads "E" and "G." See Table 1 for "Q" Values. All Dimensions in Inches at 68 degrees Fahrenheit.

Size	No. of threads per Inch—"B"	Included Taper Ins. per Foot—"b"	Pitch Diameter at Gauge Point—"C"	Major Diameter at Gauge Point—"D"	Distance from Gauge Point to Last Scratch—"g"	Width of Notch "U"	Height of Thread (Truncated)—"h"	Pitch—"p"	*Stand-off—"S"
4¾	10	¾	4.67000	4.73660	.600	.400±.100	.06660	.100	.350±.100
†4¾	10	¾	4.92000	4.98660	.700	.400±.100	.06660	.100	.450±.100
5¾	10	¾	5.67000	5.73660	.700	.400±.100	.06660	.100	.450±.100
†5¾	10	¾	5.92000	5.98660	.700	.400±.100	.06660	.100	.450±.100
6⅝	10	¾	6.54500	6.61160	.600	.400±.100	.06660	.100	.350±.100
8⅛	10	¾	8.04500	8.11160	.700	.400±.100	.06660	.100	.450±.100
†8⅛	10	¾	8.29500	8.36160	.700	.400±.100	.06660	.100	.450±.100
8⅝	10	¾	8.54500	8.61160	.600	.400±.100	0.6660	.100	.350±.100
9	8	¾	8.90000	8.98325	.625	.375±.100	.08325	.125	.375±.100
10¾	8	¾	10.65000	10.73325	.625	.375±.100	.08325	.125	.375±.100
11¾	8	¾	11.65000	11.73325	.625	.375±.100	.08325	.125	.375±.100
13⅜	8	¾	13.27500	13.35825	.625	.375±.100	.08325	.125	.375±.100
16	8	¾	15.90000	15.98325	.625	.375±.100	.08325	.125	.375±.100
18⅝	8	¾	18.52500	18.60825	.625	.375±.100	.08325	.125	.375±.100
21½	8	¾	21.40000	21.48325	.625	.375±.100	.08325	.125	.375±.100
24½	8	¾	24.40000	24.48325	.625	.375±.100	.08325	.125	.375±.100

†External upset.

Footnote to Table 4

*The purchaser may specify the "S" dimension to suit his requirements, ignoring the values given. In the absence of definite specifications for "S" from the purchaser, the values given in Table 4 will be used. The calibrated value of "S" in any case must be stamped on the ring gauge. Fitting plates may be added to gauges if desired.

See Note to Table 4.

gauges shall be truncated as indicated in column "h" in gauge tables. (See Page 46 for definition of "h" value as applied to gauges). The roots of the threads on gauges shall be cut to a sharp V, or when ground, shall be undercut to prevent the gauge from bearing on crest or root of the thread on the product.

(h) See specification on gauges for permissible tolerances, etc.

NOTE TO TABLE 6

Interchangeability—The adoption of the specified dimensions for A.P.I. drill pipe threads minimizes the difficulties of introducing this new standard as had the Briggs pitch diameter been retained large stocks of tools already in use and threaded to the larger diameter adopted by the National Tube Co. would have been too loose a fit on A.P.I. drill pipe.

Pitch Diameter—The actual pitch diameter adopted conforms to that in use by the National Tube Co. in recent years. The tabulated figure is that dimension determined by measurement of the pitch diameter at the gauge point with a thread micrometer. These values may be computed for eight pitch threads by subtracting from the nominal outside diameter of the pipe the depth of the A.P.I. thread, plus three-thousandths of an inch, which has been allowed for clearance.

TABLE 5

A.P.I. DRILL PIPE

See Figure 4

Size of A.P.I. Drill Pipe Indicates OUTSIDE Diameter. All Dimensions in Inches at 68 degrees Fahrenheit. All Weights in Pounds.

Size—"O.D."	Inside Diam.—"I.D."	Thick. of shell—"K"	Wt. per Ft. Threads ***Plain End	***Finished	No. per. in.—"B"	Included Taper Inches per ft.—"b"	Mill Test—Lbs. per sq. in.	*Upset Length—*"E"	Inside Diam. at end "M.D."	Inside Diam. full upset—"N.D."	Length of Taper "m"	Couplings Outside Diam. "C.D."	Length—"N"	Approxi. weight	Depth recess—"q"	Diam. of Coupling Recess—"Q"	Width bearing face "F"
†2-3/8	2.000	.1875	4.380	4.800	10	3/8	2500	3-1/4	1-7/16	1-7/16	1-1/2	3.250	5-1/2	6.550	1/8	2.500	5/32
2-3/8	1.815	.2800	6.264	6.650	8	3/4	2500	3-1/4	1-3/8	1-1/8	1-1/2	3.250	5-1/2	6.550	1/8	2.500	5/32
2-7/8	2.469	.2030	5.793	6.450	8	3/4	2500	3-1/2	1-7/8	1-7/8	1-1/2	3.750	6-1/2	9.260	1/8	3.000	3/16
2-7/8	2.323	.2760	7.661	8.350	8	3/4	2500	3-1/2	1-7/8	1-5/8	1-1/2	3.750	6-1/2	9.260	1/8	3.000	3/16
2-7/8	2.151	.3620	9.715	10.400	8	3/4	2500	3-1/2	1-9/16	1-3/16	1-1/2	3.750	6-1/2	9.260	1/8	3.000	3/16
3-1/2	3.063	.2187	7.665	8.500	8	3/4	2250	3-1/2	2-7/16	2-7/16	1-1/2	4.250	6-1/2	9.710	1/8	3.625	1/4
3-1/2	2.900	.3000	10.252	11.200	8	3/4	2500	3-1/2	2-1/2	2-1/8	1-1/2	4.250	6-1/2	9.710	1/8	3.625	1/4
3-1/2	2.764	.3680	12.309	13.300	8	3/4	2500	3-1/2	2-3/8	1-7/8	1-1/2	4.250	6-1/2	9.710	1/8	3.625	1/4
4-1/2	4.000	.2500	11.347	12.750	8	3/4	2000	5	3-3/8	3-1/4		5.500	8	19.930	1/8	4.625	1/4
4-1/2	3.958	.2710	12.240	13.750	8	3/4	2200	5	3-9/32	3-5/32		5.500	8	19.930	1/8	4.625	1/4
4-1/2	3.826	.3370	14.983	16.600	8	3/4	2500	5	3-1/32	2-13/16		5.500	8	19.930	1/8	4.625	1/4
5-9/16	4.975	.2940	16.544	19.000	8	3/4	1900	5	4-9/32	4-1/8		6.625	8-1/2	27.610	1/8	5.6875	1/4
5-9/16	4.859	.3520	19.590	22.200	8	3/4	2250	5	4-5/32	3-13/16		6.625	8-1/2	27.610	1/8	5.6875	1/4
5-9/16	4.733	.4150	22.817	25.250	8	3/4	2500	5	3-7/8	3-1/2		6.625	8-1/2	27.610	1/8	5.6875	1/4
6-5/8	6.065	.2800	18.974	22.200	8	3/4	1600	5	5-3/8	5-3/16		7.750	9	36.580	1/8	6.750	5/16
6-5/8	5.965	.3300	22.186	25.200	8	3/4	1800	5	5-11/32	5		7.750	9	36.580	1/8	6.750	5/16
6-5/8	5.761	.4320	28.573	31.900	8	3/4	2400	5	5-1/16	4-5/8		7.750	9	36.580	1/8	6.750	5/16

*Lengths of Upset are minimum, measured from end of pipe to commencement of radius.
‡O. D. of 5-9/16 size is 5.563 inches.
***"Weight per foot: Finished" includes threads and couplings.
"Weight per foot: Plain End" is without threads, couplings and upsets.
†On Special Order only.
Bevel on couplings recess to be 15 degrees to line parallel to axis of pipe.
Bevel on end of drill pipe to be 75 degrees to line perpendicular to axis of pipe.

TABLE 6

A.P.I. STANDARD DRILL PIPE THREADS

See Figure 4

"Size" of Drill Pipe indicates OUTSIDE Diameter. All dimensions in inches at 68 degrees Fahrenheit.

Size	Outside Diameter "O. D."	Wt., lbs. per ft. finished	No. threads per in. "B"	Included taper Inches per ft.—"b"	Total length of thread—"G"	Lgth. of threads to gauge pt. "Lgth. of perfect thrds."—"E"	Lgth. of vanishing plus imperfect threads—"g"	Ht. of threads (Truncated)—"h"	Diameter at end of pipe to root of threads—"r-r"	Diameter at end of pipe to crest of threads—"L"	Dist. end of coupling beyond last scratch. Made up by power—"R-R"	Threads allowed for makeup and creep	Dist. end of pipe to center of coupling. Made up—"J"	Stand-off of coupling at hand tight ft—"A"	
*2-3/8	2.375	4.800	10	⅝	2.125	1.667	.458	.05560	2.206	2.317	1/16"	7	9/16	4½	threads
2-3/8	2.375	6.650	8	¾	2.125	1.537	.588	.07125	2.130	2.273	1/16"	7	9/16	4½	threads
2-7/8	2.875	All	8	¾	2.625	2.037	.588	.07125	2.599	2.742	1/16"	7	9/16	4½	threads
3-1/2	3.500	All	8	¾	2.625	2.037	.588	.07125	3.224	3.367	1/16"	7	9/16	4½	threads
4-1/2	4.500	All	8	¾	3.375	2.787	.588	.07125	4.177	4.320	1/16"	7	9/16	4½	threads
5-9/16	5.563	All	8	¾	3.625	3.037	.588	.07125	5.225	5.367	1/16"	7	9/16	4½	threads
6-5/8	6.625	All	8	¾	3.875	3.287	.588	.07125	6.271	6.414	1/16"	7	9/16	4½	threads

*On special order only.

SPECIAL NOTE

Dimension "A"—The stand off "A" specified does not apply to materials used with drill pipe, such as tool joints, drill collars, etc., except where such materials have the same recess dimensions as the drill pipe couplings. See Page 45 for gauging products with A.P.I. tubular goods. (See additional notes to Table 6.)

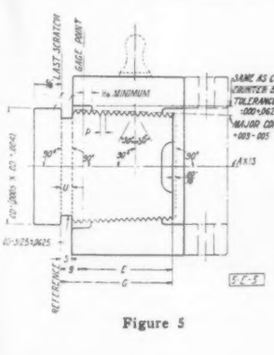


Figure 5

DRILL PIPE GAUGES

(a) All measurements referred to shoulder marked "last scratch."

(b) The small end of gauges are not measuring planes, but are finished squares with axis to assist certification.

(c) All dimensions are in inches Std. at 68 degrees Fahrenheit.

(d) The lengths of the gauges from the last scratch are unimportant within the tolerances shown.

(e) The length of the threads in the ring gauge should not be less than ("E" minus 1½ pitches).

(f) The ring gauge may be extended as shown to provide sockets for make-up bar.

(g) The crests of the threads on gauges shall be truncated as indicated in column "h" in gauge tables. (See definition of "h" value as applied to gauges.) The roots of the threads on gauges shall be cut to a sharp V, or when ground, shall be undercut to prevent the gauge from bearing on crest or root of the thread on the product.

(h) See Specifications on Gauges for permissible tolerances, etc.

Tubing Gauges

(a) All measurements referred to shoulder marked "last scratch."

(b) The small end of gauges are not measuring planes, but are finished square with axis to assist certification.

(c) All dimensions are in inches Standard at 68 degrees Fahrenheit.

(d) The lengths of the gauges from the last scratch are unimportant within the tolerances shown.

(e) The length of the threads in the ring gauge should not be less than ("E" minus 1½ pitches).

(f) The ring gauge may be extended as shown to provide sockets for make-up bar.

(g) The crests of the threads on gauges shall be truncated as indicated in column "h" in gauge tables. (See definition of "h" value as applied to gauges.) The roots of the threads on gauges shall be cut to a sharp V, or when ground, shall be undercut to prevent the gauge from bearing on crest or root of the thread on the product.

(h) See Specifications on Gauges for permissible tolerances, etc.

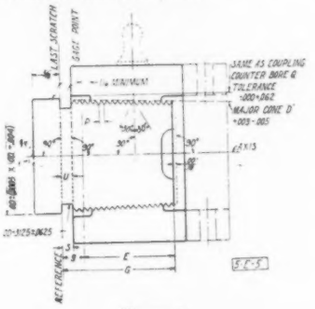


Figure 8

SPECIFICATIONS FOR A.P.I. TUBULAR GAUGES

(See Figures 3, 5, and 8)

Plug

1. The certified master plug shall be the control and shall be a physical reproduction of the thread on the pipe.

2. The lead may vary plus or minus 1/10000 inch per inch of length from basic, and shall be measured over a length of axis beginning and ending not less than one-quarter inch from the ends of the threaded portion, but the tolerance for gauges of three-eighths-inch taper per foot shall be the limits plus or minus 3/10000 inch from basic, and the tolerance for gauges of three-quarters-inch taper per foot shall be the limits plus or minus 5/10000 inch from basic.

3. The included taper on diameter in the length "E" shall lie between the limits (Basic) and (Basis plus E/10000 inches) and shall be measured over a length of axis beginning and ending not less than one-quarter inch from the ends of the threaded portion, but the tolerance for gauges of three-eighths-inch taper per foot shall be the limits (Basic) to (Basic plus 5/10000 inch) and the tolerance for gauges of three-quarters-inch taper per foot shall be the limits (Basic) to (Basic plus 1/1000 inch).

4. The flanks of the thread may vary from the basic angle of 30 degrees to the normal by not more than plus or minus 10 minutes of arc.

5. The pitch diameter at the gauge point shall lie between the limits (Basic plus or minus E/10000 inches) but the tolerance for gauges of three-eighths-inch taper per foot shall be the limits (Basic plus or minus .0005), and the tolerance for gauges of three-quarters-inch taper per foot shall be the limits (Basic plus or minus .001).

6. The above tolerances are subject to the additional condition that the cumulative error must not exceed one-half turn for gauges of three-eighth-inch taper foot and one-third turn for gauges of three-quarters-inch taper foot. This means that if the error in any element exceeds the specified unit tolerance, some other element or elements must be a sufficient amount inside of the specified tolerance to compensate for the excess error.

Ring

1. The ring is not standard and its definition of size is obtained by calibration from the certified master plug.

2. To be a reliable transfer medium it must be certified for lead, taper and form of thread.

3. The lead may vary plus or minus 2/10000 inch per inch of length from basic and shall be measured over a length of axis beginning and ending not less than one-quarter inch from the ends of the threaded portion but the tolerance for gauges of three-eighths-inch taper per foot shall be the limits plus or minus 5/10000 inch from basic, and the tolerance for gauges of three-quarters-inch taper per foot shall be limits plus or minus 8/10000 inch from basic.

4. The included taper on diameter in the length "E" shall lie between the limits

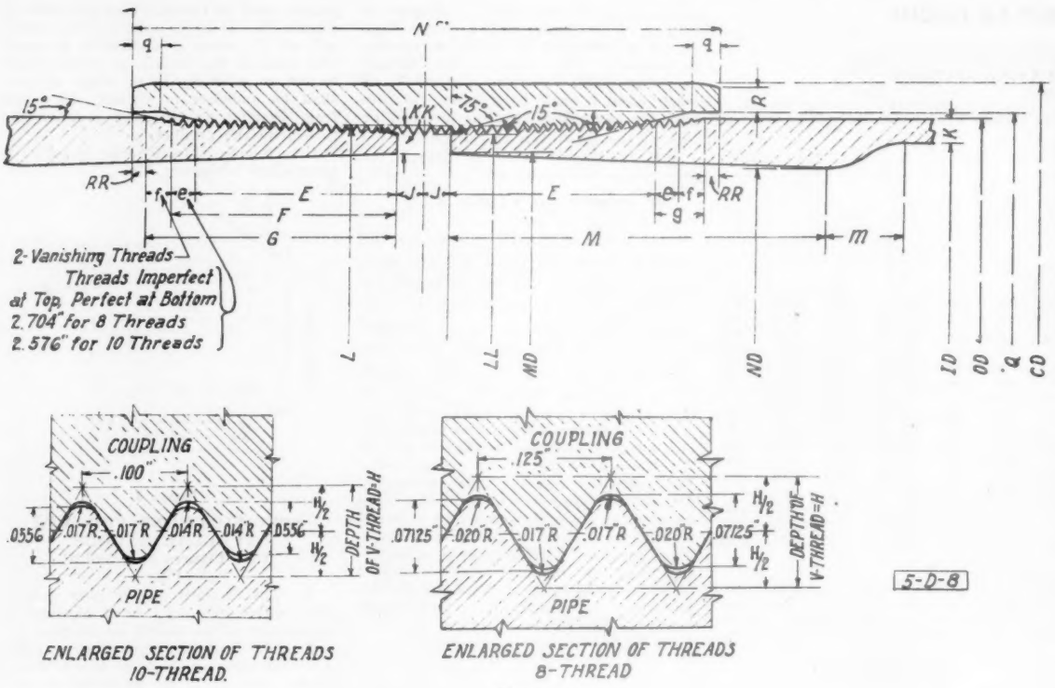


Figure 4

TABLE 7
A.P.I. DRILL PIPE GAUGES
See Figure 5
See Table 6 for Thread Lengths "E" and "G". See Table 5 for "Q" Values.
All Dimensions in Inches at 68 Degrees Fahrenheit.

Size	Outside Diameter "O. D."	Number of Threads per Inch—"B"	Included Taper Inches per Foot—"b"	**Pitch Diameter at Gauge Point—"C"	Major Diameter at Gauge Point—"D"	Distance from Gauge Point to Last Scratch—"K"	Width of Notch "W"	Height of Thread (Truncated)—"h"	Pitch—"P"	*Stand-off—"S"
2-3/8	2.375	10	3/8	2.31640	2.35200	.458	.20±.100	.03560	.100	.208±.100
2-3/8	2.375	8	3/4	2.30075	2.34900	.588	.25±.100	.04825	.125	.388±.100
2-7/8	2.875	8	3/4	2.80075	2.84900	.588	.25±.100	.04825	.125	.388±.100
3-1/2	3.500	8	3/4	3.42575	3.47400	.588	.25±.100	.04825	.125	.388±.100
4-1/2	4.500	8	3/4	4.42575	4.47400	.588	.25±.100	.04825	.125	.388±.100
5-9/16	5.563	8	3/4	5.48875	5.53700	.588	.25±.100	.04825	.125	.388±.100
6-5/8	6.625	8	3/4	6.55075	6.59900	.588	.25±.100	.04825	.125	.388±.100

*The purchaser may specify the "S" dimension to suit his requirements, ignoring the values given. In the absence of definite specifications for "S" from the purchaser, the values given above will be used. The calibrated value of "S" in any case must be stamped on the ring gauge. Fitting plates may be added to gauges if desired.
**Pitch diameter as determined by thread micrometers.

TABLE 8
A.P.I. STANDARD TUBING—PLAIN
See Figure 6
"Size" of A.P.I. Tubing Indicate NOMINAL Diameter
All Dimensions in Inches at 68 degrees Fahrenheit

Size	Diameters			Weight Lbs. per Ft.		Threads		Mill Test Lbs. per sq. inch		Couplings				
	Outside—"O. D."	Inside—"I.D."	Thickness of Shell "K"	*Plain End	*Finished	No. per inch—"B"	Included taper in. per ft.—"b"	Lapweld	Seamless	Outside Diameter "C. D."	Length—"N"	Weight	Depth of recess "q"	Diameter of recess "Q"	Width of bearing face—"R"
2	2.375	1.995	.190	4.433	4.600	11-1/2	3/4	2500	2500	2.870	4.250	2.769	.500	2.4375	.1875
2-1/2	2.875	2.441	.217	6.160	6.400	11-1/2	3-4	2300	2500	3.517	5.250	5.352	.500	2.9375	.2500
3	3.500	3.018	.241	8.388	8.700	11-1/2	3/4	2000	2500	4.200	5.875	7.939	.500	3.5625	.2500
†3	3.500	2.922	.289	9.910	10.200	11-1/2	3/4	2500	2500	4.200	5.875	7.939	.500	3.5625	.2500
4	4.500	3.958	.271	12.240	12.600	10	3/4	1800	2200	5.216	6.375	11.324	.500	4.5625	.2500

Note: Bevel on coupling recess to be 35 degrees to line parallel to axis of tubing.
Bevel on end of tubing to be 60 degrees to line perpendicular to axis of tubing.
*"Weight per foot, Finished," includes threads and couplings.
**"Weights per foot, Plain End," is without threads or couplings.
Weights are estimated only; wall thickness is specified exactly.
†On special order only.

TABLE 9
A.P.I. STANDARD TUBING—EXTERNAL UPSET
See Figure 7
"Size" of A.P.I. Tubing Indicates NOMINAL Diameter.
All Dimensions in Inches at 68 Degrees Fahrenheit.

Size	Diameter *			Weight Lbs. per foot		Upset			Threads		Mill Test Pounds Per Sq. In.		Couplings					
	Outside "O.D."	Inside—"I.D."	Thickness of Shell "K"	*Plain End	*Finished	Outside Diameter "U. D."	Total Length "M"	Length of Taper Nominal—"m"	No. per in. —"B"	Included taper, in. per ft.—"b"	Lapweld	Seamless	Outside Diameter "C. D."	Length—"N"	Weight	Depth of recess "q"	Diam. of recess "Q"	Width of bearing face—"R"
1-1/4	1.660	1.380	.140	2.272	2.400	1.81250	2.000	1.00	11-1/2	3/3	2500	2500	2.200	3.500	1.421	.250	1.87500	.12500
1-1/2	1.900	1.610	.145	2.717	2.900	2.09375	2.250	1.00	11-1/2	3/4	2300	2500	2.500	3.750	1.824	.250	2.15625	.12500
2	2.375	1.995	.190	4.433	4.700	2.59375	3.500	1.00	10	3/4	2500	2500	3.060	4.875	3.263	.500	2.65625	.15625
2-1/2	2.875	2.441	.217	6.160	6.500	3.09375	3.750	1.00	10	3/4	2300	2500	3.668	5.375	5.379	.500	3.15625	.21875
3	3.500	2.992	.254	8.805	9.300	3.75000	4.000	1.00	10	3/4	2200	2500	4.504	6.000	9.351	.500	3.81250	.25000

Note: Bevel on coupling recess to be 35 degrees to line parallel to axis of tubing.
Bevel on end of tubing to be 60 degrees to line perpendicular to axis of tubing.
*"Weight per foot, Finished," includes threads and couplings.
**"Weight per foot, Plain End," without threads, couplings and upset.
Weights are estimated only; wall thickness is specified exactly.

(Basic—2/10000) and (Basic—12/10000) inches for all sizes and shall be measured over a length of axis beginning and ending not less than one-quarter inch from the ends of the threaded portion.

5. The flanks of the thread may vary from the basic angle of 30 degrees to the normal by not more than plus or minus 15 minutes of arc.

6. The above tolerances are subject to the additional condition that the cumulative error as calculated from the unit errors must not exceed one-half turn for gauges of three-eighths-inch taper per foot and one-third turn for gauges of three-quarters-inch taper per foot. This means that if the error in any element exceeds the specified unit tolerance, some other element or elements must be a sufficient amount inside of the specified tolerances to compensate for the excess error.

General

1. Certified master plugs should preferably be of hardened and ground alloy steel properly heat treated and aged to prevent secular change of size.

2. Transfer ring gauges up to 7 inches pitch diameter may be of soft steel with chased thread.

3. Transfer ring gauges over 7 inches pitch diameter should preferably be of hardened and ground alloy steel. If the transfer ring is solid (not built up), a fitting plate may be attached to the large end face. If the transfer ring is solid and no fitting plate is attached the dimension "S" need not be held closely to a defined size. When fitting plate is used, the value "S" may be specified as an absolute amount at the option of the purchaser. In any case, the value of "S," after calibration with the master plug, shall be stamped on the ring gauge.

AMERICAN PRACTICE FOR GAUGING TUBULAR GOODS (1926)

(See Figure 9)

Foreword: The committee, (on recommendations from the A.P.I. Correlating Committee on Gauges and Gauging Practice), has adopted a type of gauge and a system of gauging tubular material, developed by the National Tube Co., which it is believed will eventually enable the committee to specify the stand-off of the coupling on the pipe at hand-tight fit, referred to as "A" in these specifications.

As the matter now stands, this dimension "A" involves several variables; i.e., accuracy of threading on both the pipe and the coupling, material in pipe and coupling, and weight and thickness of pipe.

For example, 8⅛-inch A.P.I. casing varies from .32-inch to .47-inch thick, or about 50 per cent increase in thickness, with a further provision that the ends of the pipe may be upset. In this case, upsetting gives a thickness at the end of the pipe more than twice the wall thickness of the .32-inch thick pipe. Assuming the accuracy of threading to be the same, and the couplings made from the same material, it has been found in practice that the coupling becomes tight on the heavy weight pipe much quicker than on the lighter weight pipe. To establish a definite dimension for "A" at this time does not appear to be feasible. It is hoped, however, as a result of experience, that definite values can eventually be assigned for "A" in the various thread tables contained herein.

The new type of gauge is based on the fact that the plug is the master and the ring gauge is only a transfer medium. The ring may be made similar to a coupling as to outside diameter, form, depth of recess, etc. The imperfect or vanishing threads of the pipe are eliminated on this type of plug gauge, and instead a groove is cut, in width approximating the vanishing threads, to a depth slightly below the root of the thread on the plug gauge, and the inside edge of the groove of the collar represents the last scratch of thread on the pipe and gauge.

The plug gauge, being the master, is made to specified dimensions regarding outside diameter, pitch diameter, taper, form of thread, etc., and is to be certified by the Bureau of Standards at Washington, D. C. The ring, to be a reliable

(Continued on Page 280)

In Service Everywhere

Left: Battery of ROBINSONS at compressor plant, Dominguez, California. *Center:* Two ROBINSONS on Roscoe Lease, Bowlegs, Oklahoma. *Right:* A ROBINSON at Huntington Beach, California.

Wherever there's an Orifice Meter —there should be a Robinson Fitting

..Why?.. because it eliminates by-passing arrangement completely—because the plate can be changed in a few minutes—because flow is not interrupted, nor is there any hazard while change is being made—because the orifice is always centered in the line—because accuracy of measurement is increased and because the gas cannot leak. You can secure these savings and advantages ONLY by using the ROBINSON Orifice Fitting. There is nothing like it! Write for complete details today—ask about its application to the gas lift.

ROBINSON ORIFICE FITTING COMPANY
1435 Santa Fe Avenue, Los Angeles, California

California Distributors: Westcott & Greis, Inc., Los Angeles; Jensen Instrument Co., Los Angeles.
Mid-Continent Distributors: B & A Specialty Co., Tulsa, Houston; Westcott & Greis, Inc., Tulsa, Dallas.

ROBINSON ORIFICE FITTING

Standard Shaft Lengths

Send for our bulletins descriptive of these gear units.

The Nuttall Company is heartily in accord with the campaign of the American Petroleum Institute to standardize oil field equipment. Nuttall pump gear units are built with drive shaft lengths conforming to A.P.I. rig iron standards. The OP-13 and OP-14 units have shaft lengths of 7 feet 6 inches, while those of the OP-15 and OP-16 are 5 feet 6 inches. These standard shaft lengths allow the installation of a sprocket on the crank shaft extension to drive the standard calf wheels or production hoist.

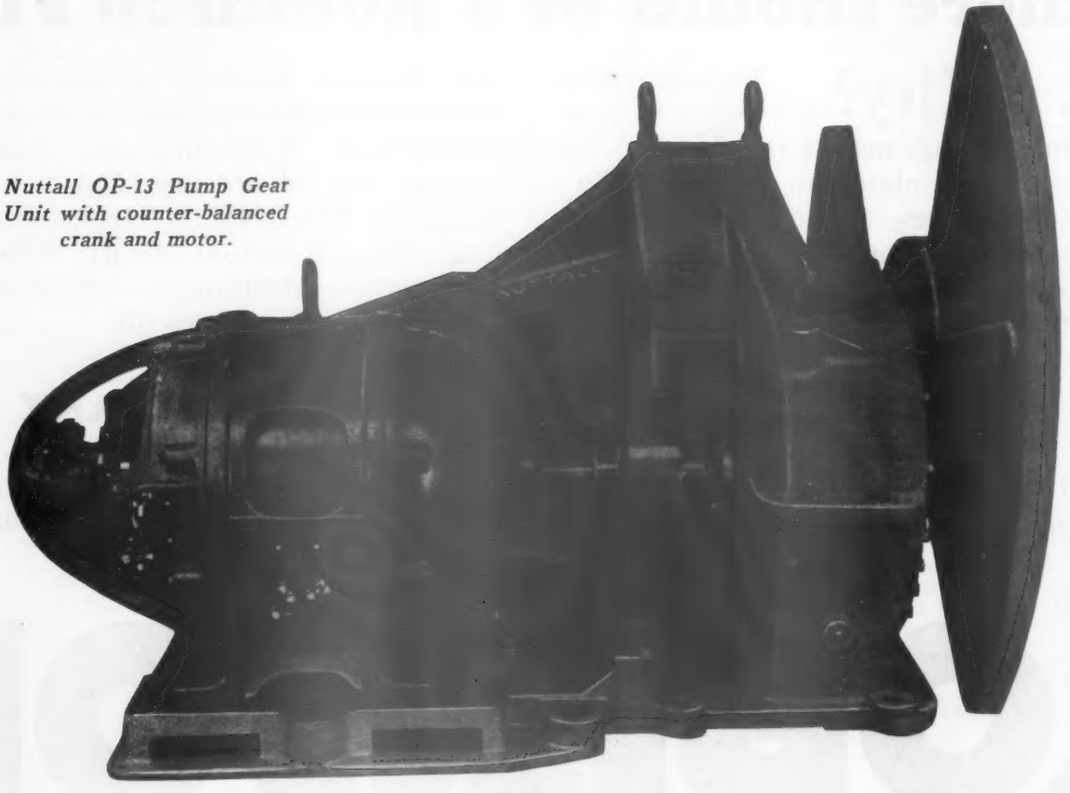
R. D. NUTTALL CO., Pittsburgh, Pa.

Houston
Union Nat'l Bank Bldg.

Los Angeles
420 S. San Pedro St.

OIL WELL SUPPLY CO., *Authorized Distributor*

Nuttall OP-13 Pump Gear Unit with counter-balanced crank and motor.



Nuttall

A.P.I. Pumping Equipment and Engines

Great Progress Made in Standardization With Equipment Used in Many Fields and By Numerous Companies

T. E. Swigart
National Chairman, Shell Company of California, Los Angeles, Calif.
John R. Suman
National Vice Chairman, Humble Oil & Refining Co., Houston, Texas
P. B. Roberts
National Secretary, Honolulu Consolidated Co., San Francisco, Calif.

Probably only a few oil operators appreciate the extent to which standardization of pumping equipment has been accomplished. For two and one-half years the A. P. I. committee on pumping equipment and engines has been engaged in de-

T. E. SWIGART

veloping standards, and today the major items are found in specification form.

Tubing, sucker rods and oil well pumps, as well as other miscellaneous items, have been standardized and are already being used by operators in varying quantities. Standards for foundation bolts and clutch flange connections of internal combustion

JOHN R. SUMAN

engines, as well as engineering methods of rating engines, have also been developed.

In the following sections are given a resume of the committee's work on each piece of pumping equipment.

Oil Well Tubing

Specifications for 2-inch, 2½-inch, 3-inch, 3½-inch and 4-inch plain tubing and for 1-inch, 1¼-inch, 1½-inch, 2-inch, 2½-inch, 3-inch, 3½-inch and 4-inch upset tubing have been adopted. Excepting the standards for 3½-inch plain and 3½-inch and 4-inch upset tubing which were decided upon at the 1927 Colorado Springs meeting, tubing specifications have been issued in final form as A. P. I. standards No. 5-A.

A. P. I. tubing by virtue of long collars and long-thread engagement, as well as certain details of thread and coupling design, is a greatly superior product to the old style of tubing that has been in common use. Figures 1 and 2 compare old-style tubing with A. P. I. The improvements in design of A. P. I. tubing over old-style are clearly illustrated by these drawings. By virtue of having longer thread engagement, A. P. I. tubing is stronger when first made up and is capable of withstanding the making and breaking of joints for a longer period of time without weakening the tubing than is the old style. This is an advantage, of course, not only because of less danger of parting, but because of less chance for coupling leaks.

The collars of A. P. I. tubing are so recessed that the joints are readily stabbed and will not cross thread.

A. P. I. plain tubing is threaded with 11½ threads per inch and upset tubing with 10 threads per inch, with the exception of 3½-inch and 4-inch plain tubing which have 10 threads and 1¼-inch and 1½-inch upset tubing which have 11½ threads. Although some prejudice has existed among certain operators against the use of 10-thread tubing, still this has been largely overcome by splendid results which 10-thread tubing has given in California where at present the longest strings are in use.

Recent reports indicate that many Mid-Continent operators are now ordering A. P. I. Tubing, while actual records show that a surprisingly large amount of A. P. I. tubing has been sold in California during the past year. By May 31, 1927, five suppliers had sold 3,656,000 feet or 692 miles of A. P. I. specification tubing in California, 90 per cent of which was 10-thread upset. In so far as can be learned, all California operators are now specifying A. P. I. tubing. The largest supplier had distributed 2,286,000 feet or 433 miles of tubing among more than 50 customers and to May 31, 1927, had not received a single complaint on the A. P. I. joint. The advantages to oil operators in the use of A. P. I. tubing were clearly set forth by W. L. McLaine in

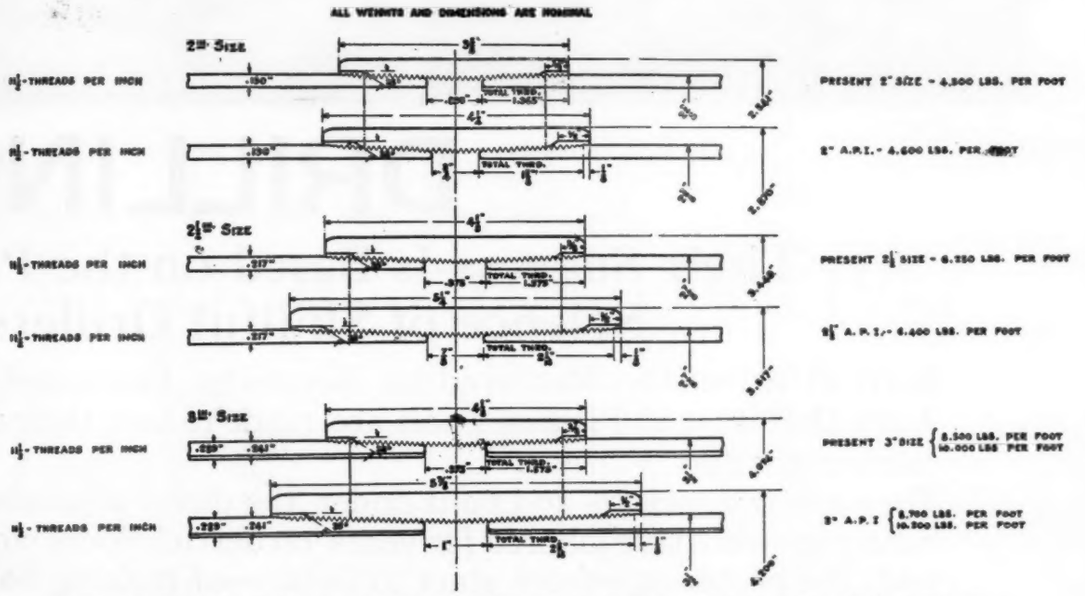

ALL WEIGHTS AND DIMENSIONS ARE NOMINAL
2" SIZE
2½" SIZE
3" SIZE
PRESENT 2" SIZE - 4.500 LBS. PER FOOT
2" A.P.I. - 4.600 LBS. PER FOOT
PRESENT 2½" SIZE - 6.250 LBS. PER FOOT
2½" A. P. I. - 6.400 LBS. PER FOOT
PRESENT 3" SIZE
8.500 LBS. PER FOOT
10.000 LBS PER FOOT
3" A.P.I
8.700 LBS. PER FOOT
10.300 LBS. PER FOOT

Figure 1—Comparison of old style and A.P.I. plain tubing, after T. D. Davies and J. B. Graham, National Tube Co.

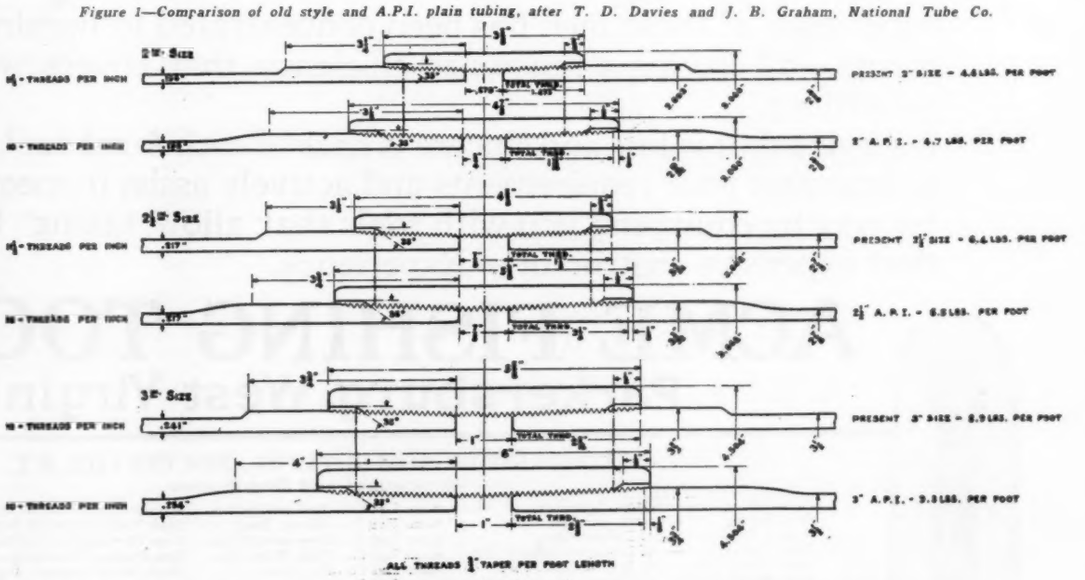
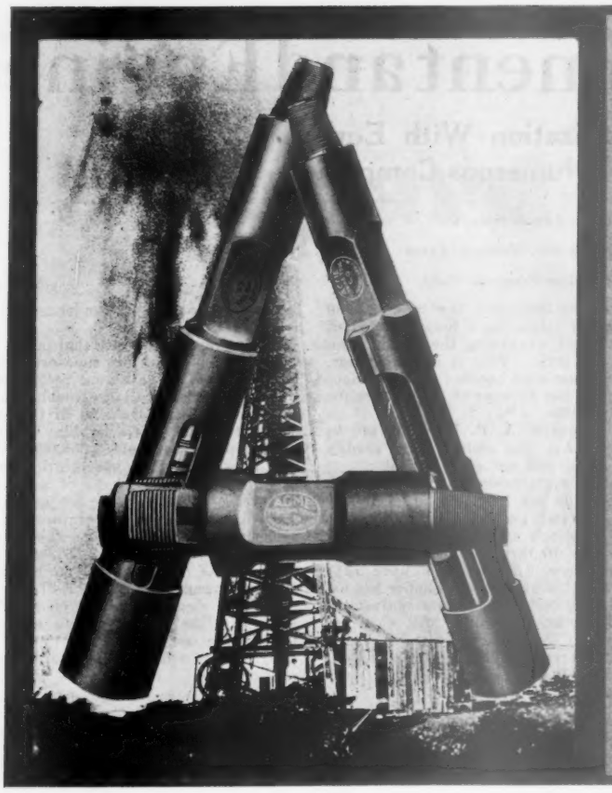
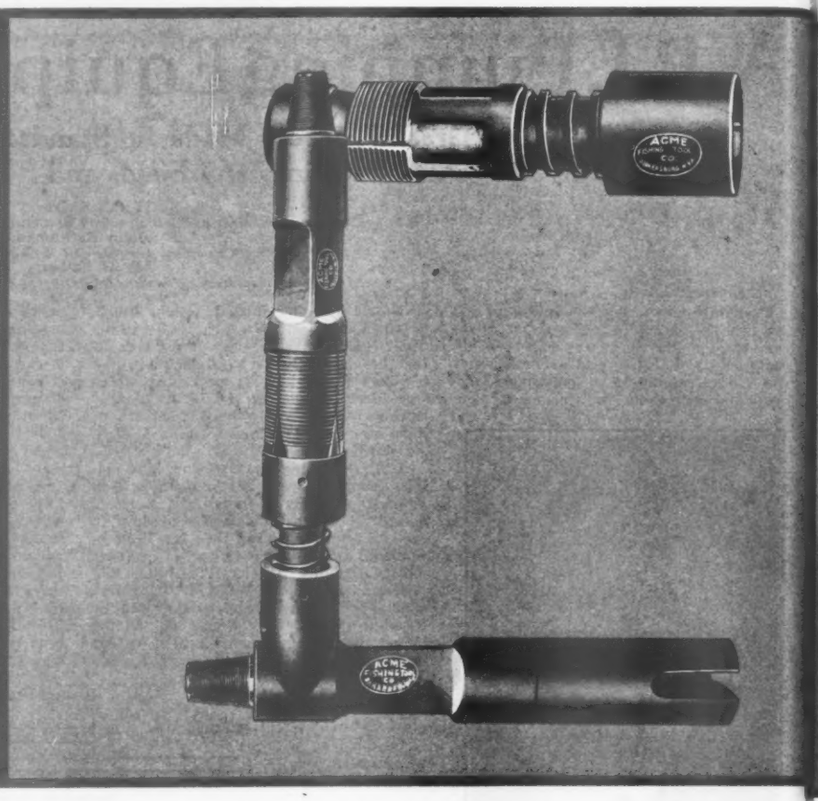

2" SIZE
2½" SIZE
3" SIZE
PRESENT 2" SIZE - 4.6 LBS. PER FOOT
2" A. P. I. - 4.7 LBS. PER FOOT
PRESENT 2½" SIZE - 6.4 LBS. PER FOOT
2½" A. P. I. - 6.5 LBS. PER FOOT
PRESENT 3" SIZE - 8.9 LBS. PER FOOT
3" A.P.I. - 9.3 LBS. PER FOOT
ALL THREADS ¾" TAPER PER FOOT LENGTH

Figure 2—Comparison of old style and A.P.I. Upset Tubing, after T. D. Davies and J. B. Graham, National Tube Co.





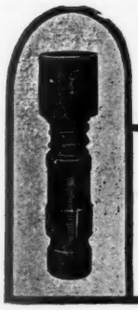
DRILLING AND F

Their Success Is Based on the Practical Science of Skillful Drillers

Born of Adversity, Mothered by Necessity, Fashioned by Experience—Acme Drilling and Fishing Tools are made to save their users from the mistakes of the past.

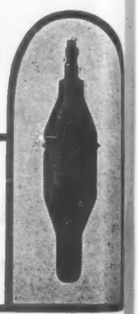
They are designed by and built under the direct supervision of drillers and fishermen who have labored for years on derrick floors wrestling face to face with the problems,—from start to finish,—of making hole. The combined experience of these men has been concentrated in hundreds of steel implements,—all having a renowned efficiency that covers world-wide drilling conditions.

A service that is fair and sincere is back of each Acme tool, ready to accurately interpret your requirements and actively assist in meeting them in a better way by equipping you with tools that allow taking full advantage of that expensive instructor— Experience.



ACME FISHING TOOL CO.

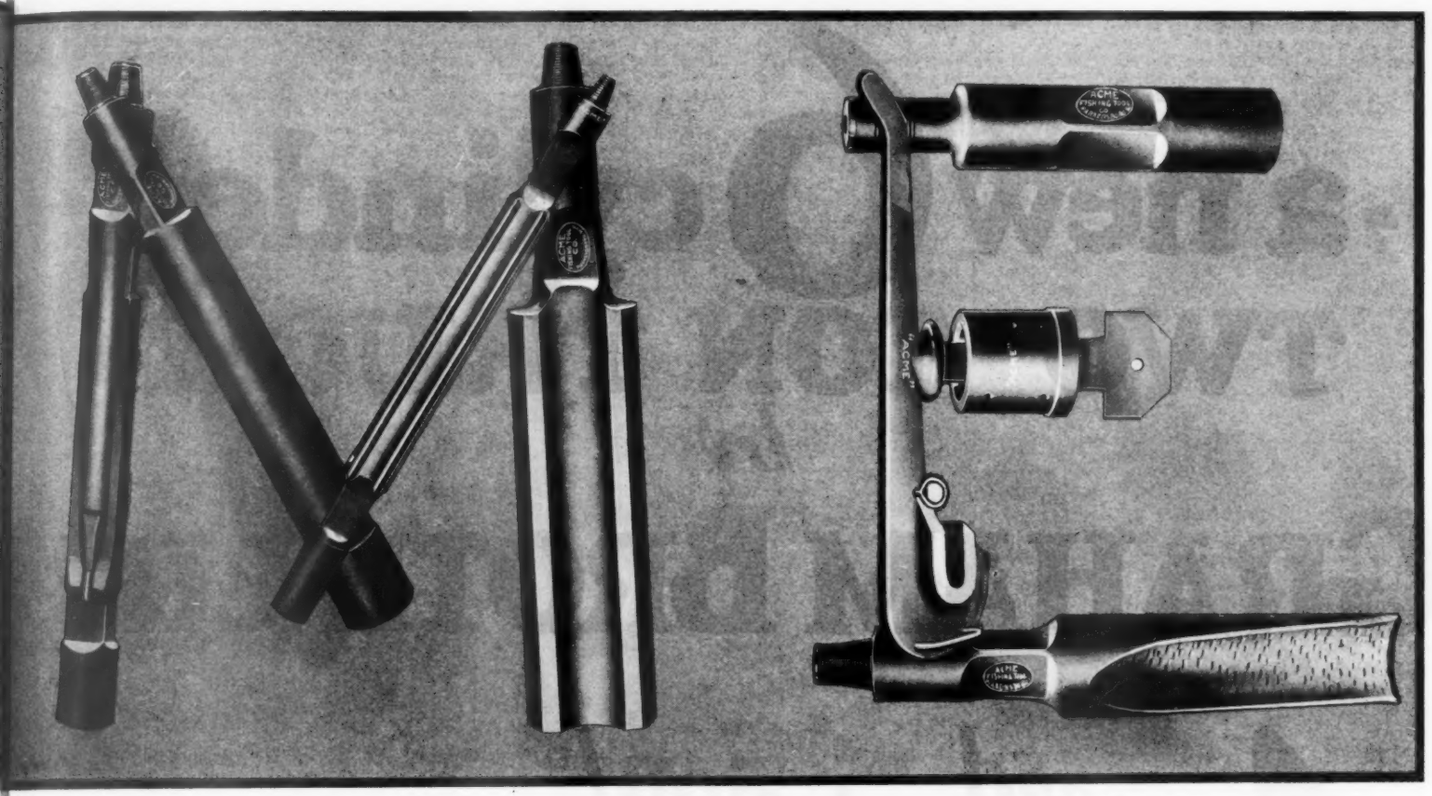
Parkersburg, West Virginia.



Export Office: 136 Liberty St., New York City, N.Y.

Warehouses and Distributors:

Acme Fishing Tool Company—Parkersburg, W. Va.
Acme Fishing Tool Company—Omulgee, Okla.
B. & A. Specialty Company—Tulsa, Okla.
Acme Fishing Tool Co. of Tex.—Whittenburg, Tex.
Acme Fishing Tool Co. of Tex.—Roxana, Texas.
Acme Rental Tool Service Company—Graham, Tex.
Acme Tool Co.—Breckenridge, Tex.
Acme Tool Co.—Albany, Texas.
Acme Tool Co.—Brownwood, Texas.
Acme Tool Co.—Cross Plains, Tex.
Acme Tool Co.—Fry, Texas.
Acme Tool Co.—McCamey, Texas.
Midland Iron Works—Billings, Montana.
Great Northern Tool & Supply Co.—Kevin, Montana.
Great Northern Tool & Supply Co.—Kemmerer, Wyo.
Elms Brothers & Company—Waynesburg, Penna.
Lloyd, Smith Company—Bradford, Penna.
Logan Foundry & Machine Company—Logan, Ohio.



FISHING TOOLS

ACME'S CONTRIBUTION FOR 1927

3 NEW TOOLS

THAT HAVE LONG BEEN THE STANDARD OF THEIR KIND

There has never been a year in which Acme has been able to offer its standards in Service, Quality and Value in greater measure than this year. Three really famous products have been reborn into the large and successful family of Acme Tools and will be exclusively manufactured by Acme in the future.

B & R WIRE LINE DRILLING CLAMP

Greatest gripping power; fewest parts; lighter than most clamps yet will drill to 6000 feet safely; easily handled on shallow or deep wells; simple and strong; slips interchangeable and quickly changed; protects cable; handles cable and sand line at same time; has several handy uses not found in ordinary clamps. Patented by Bell and Rogers. First introduced by Carter Oil Company. *Made only by Acme.*

DEVIL'S STEEL HAND

Fingers set oversize expand as they pass shoe and cover entire hole; will fish 20-30" in soft cavings and close up whether bottom is reached or not; in rotary type, circulating fluid is delivered crosswise of hole at very bottom of tool; sturdy construction gives long service with reasonable use and saves their cost over and over. *Made only by Acme.*

THE BROWN UNDERREAMER

Has 3 cutters instead of 2; cutters hang on stationary assembly and are held absolutely rigid; bottom of body is a plain end cylinder for longer life; alloy tool steel bodies permit maximum hardening without strains; all wear on cutter shanks or inside of body causes cutting edges to move outward; rounded corners enable cutters to hold their edge longer,—corners do not burn off in the forge,—less liable to check in hardening,—easier dressed; chances of losing cutters in entering the pipe are eliminated; this tool can also be used to straighten crooked holes. *Made only by Acme.*

B & R WIRE LINE DRILLING CLAMP

The simplest clamp with

the greatest gripping power.

DEVIL'S STEEL HAND

To be without this fishing tool when you need it often costs more than its price. Have it on hand to fish quick, instead of skidding the rig later.

BROWN'S UNDERREAMER

This underreamer will not keyseat a hole,—has cutters that are easily dressed and of form that permits dressing to gauge,—has a body that wears long and is easily repaired,—eliminates most of the causes for lost cutters,—gives a low cost per foot for cutters.

-a new 6 cylinder TWO-TON TRUCK by GRAHAM BROTHERS

4 speed transmission!

Four speeds forward . . . That irresistible pull of the low low for hole or hill . . . All the speed you want on the level.

4 wheel brakes (Lockheed Hydraulic)!

Positive, dependable brakes that make possible the fullest use of the engine's power without risk . . . Self adjusting.

Heavy loads can now travel at higher speed with perfect safety —on the new Graham Brothers 6-cylinder 2-Ton Truck.

Engineers proclaim it the most advanced motor truck. See it. Compare it with any other motor truck. *Then note the price.*

. . . and the price $1595

(CHASSIS F. O. B. DETROIT)

GRAHAM BROTHERS
EVANSVILLE – DETROIT – STOCKTON
A DIVISION OF DODGE BROTHERS, INC.
GRAHAM BROTHERS (CANADA) LIMITED, TORONTO, ONTARIO

SOLD BY DODGE BROTHERS DEALERS EVERYWHERE

a paper read before the institute at the June, 1927, meeting at Colorado Springs. Quoting from Mr. McLaine:

Advantages Cited

"Aside from these technical arguments which it must be admitted favor 10-thread upset tubing, I wish to point out other advantages of adopting A. P. I. standard tubing.

1. If A. P. I. standards are used, tubing of different makes will go together

W. R. GUIBERSON
Pumping Equipment and Engines

properly and safely, in the field.

2. Operators not using A. P. I. specifications will be purchasing "special order" goods. While this might be obtained now at the same cost of A. P. I. standard tubing, still in rush periods, the tendency of manufacturers will be to make and stock A. P. I. standard tubing and any other kinds may sell for a premium because it will be a special order. Also in rush times the suppliers' stocks will all be made up of A. P. I. tubing

KENNETH C. SCLATER
Pumping Equipment and Engines

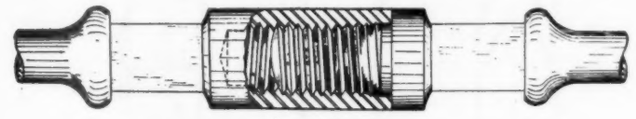
and orders of special tubing will either have to be foreseen two or three months ahead, or delays will occur and substitutes of A. P. I. tubing will have to be made.

3. Use of special sizes necessitate increases in producers' stocks of tubing and subnipples and will add to general confusion in the field by introducing special sizes.

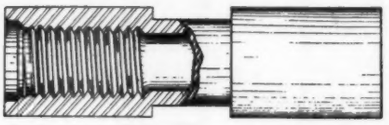
4. Working barrels, tubing catchers and tubing heads will all be manufactured with A. P. I. standard threads and the use of any other kind of tubing will require subnipples or special order barrels, catchers and the like. Such practice will be so costly and bothersome that an operator should not countenance it when the whole matter can be so satisfactorily settled by using A. P. I. tubing.

5. No standards or gauges have been established for any but strictly A. P. I. standard tubing and failure to use A. P. I. standards loses the producer all the advantages of standardization, namely, workmanship, interchangeability, recourse to manufacturer in the event of imperfections in special sizes, and the like.

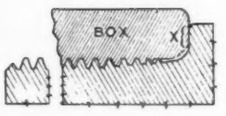
"I can only think of one possible disadvantage to the adoption of A. P. I. tubing and that is the inconvenience at a few wells where the new tubing will have to be mixed with the old. This objection strikes at the heart of our standardization work for if we were to allow this objection to rule, the standardization movement might as well never have been started.



A.- A.P.I. BOX AND PIN TYPE JOINT



B.- A.P.I. COUPLING FOR DOUBLE PIN RODS



C.- THREAD DETAILS OF A.P.I. PIN AND BOX

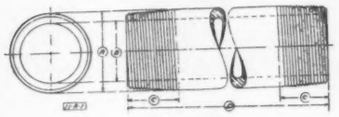
Figure 4

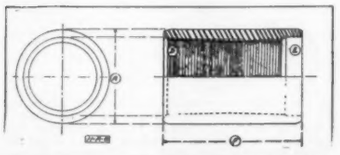
"The inconvenience of mixing tubing is suffered alike by all operators whether eastern, Mid-Continent or California, because the new joints are different from all of the old joints in length of thread engagement and subnipples must be used in mixed strings to insure greatest safety. We are largely overcoming the necessity for mixed strings in California by installing complete new strings of A. P. I. tubing in wells and salvaging the good joints of the old-style tubing. Occasionally when a few joints of old-style tubing are bad in a certain well, they are replaced from the salvage stock of old-style tubing. In addition we use much old-style tubing that is no longer fit to run in wells for line pipe, so actually very little mixing of strings is necessary."

The practicability and superiority of of A. P. I. tubing has been clearly proved in the field and the committee has no hesitancy in urging oil operators who have not already adopted A. P. I. tubing to do so without delay.

Sucker Rods

The committee after some 18 months of concentrated work has adopted a standard design and gauging system for A. P. I. five-eights inch, three-fourths inch and seven-eighths inch sucker rods. The





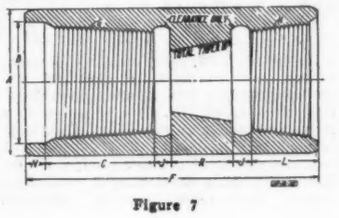


Figure 7

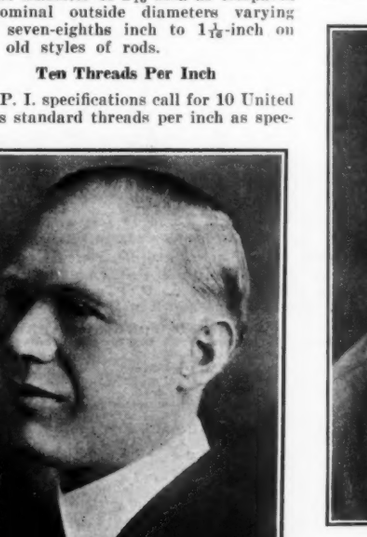
details of the design are pictured clearly in Figure 4.

The history of the development of the A. P. I. sucker rod is of particular interest. During the early days of the committee it was found that many differences of opinion existed among operators regarding the design of sucker rod joints and the importance of design. These difficulties were so marked that it became apparent that the committee as a whole could not expect to develop a standard design along engineering lines, so the then national chairman, W. L. McLaine, appointed a subcommittee and charged the subcommittee with the duty of developing a proposed standard A. P. I. sucker rod joint. This subcommittee of six engineers included some of the most capable men obtainable, both from the operators and rod manufacturers, and every point of design was studied and determined upon only after mature deliberation.

The sucker rod joint shown in Figure 4 has several features of especial interest. The diameters of the pins for respective sizes of rods were increased over the diameters in use by the majority of manufacturers in order to give greater strength. For example, the three-quarter inch A. P. I. sucker rod has a nominal outside diameter of $1\frac{1}{16}$-inch as compared to nominal outside diameters varying from seven-eighths inch to $1\frac{1}{16}$-inch on most old styles of rods.

Ten Threads Per Inch

A. P. I. specifications call for 10 United States standard threads per inch as specified by the National Screw Thread Commission. The screw thread commission allows both a sharp and a flat-top form of thread and the flat-top form was adopted by the committee for the A. P. I. sucker rod joint in the interest of ruggedness. (See Figure 4-C.) Another valuable feature of the A. P. I. sucker rod joint is the provision for a vanishing thread as shown also in Figure 4-C. The crests of the last two threads on the box and the roots of the last four threads on the pin are vanished with a taper of 9 degrees in order to provide additional stock near the base of the pin and thus prevent pin breakages which, observation shows, tend to occur in the first or second thread. At the base of the pin a



F. E. ANDERSON
Sucker Rods

W. L. CONNELLY
Pumping Equipment and Engines

fillet is provided between the pin cylinder and pin collar. This again is an accepted principle of engineering design to provide against pin breakages at the contact of the pin and pin collar.

The sucker rod coupling for double pin rods is of larger diameter than the pin collar in order to provide stock in the coupling which will wear and at the same time prevent wear of the pin collar. As couplings wear down to or near the diameter of the pin collar, they can be replaced with new couplings at lost cost and the entire length of the sucker rod preserved for further use. This would not

HOLLIS B. PORTER
Pumping Equipment and Engines

be possible if the outside diameter of the coupling was the same as the outside diameter of the pin collar, because the rod itself would wear in that case and would require replacing as wear became great.

The A. P. I. sucker rod joint is so designed that the face of the coupling makes contact with the face of the pin collar as shown at "X," Figure 4-C. In making up A. P. I. sucker rod joints in the field, the coupling should always be shouldered against the pin collar face. However, the tolerances on A. P. I. sucker rod threads are so narrow and the gauging system provided is so accurate that the threads will always make up

tight and thus make additional provision against unscrewing.

Thus while the A. P. I. sucker rod joint is not an exact duplicate of any sucker rod joint now sold by manufacturers, it includes the best principles of design of several different makes and is expected to provide a superior joint.

Deep Well Pumping

The problem of deep well pumping is one of grave concern both to oil operators and to sucker rod manufacturers. In California, wells of 5,000 feet and more in depth are being pumped and wells up to 6,800 feet are now flowing but some day may require pumping. It is believed that the A. P. I. design of Sucker rod joints will certainly meet the requirements of present deep wells, provided manufacturers are able to develop alloy steels or heat treating processes which will increase the strength of rods beyond the strengths of present sucker rod steels. In other words, the sucker rod problem at this time appears to be one of materials rather than design.

Several manufacturers are now actively producing sucker rods with A.P.I. joints, although the final ratification of dimensions and gauge specifications was only reached at the 1927 Colorado Springs meeting. Many operators are already specifying A. P. I. rods and several producers at the request of the national chairman are keeping careful field service records in order that complete information regarding the practicability of the A. P. I. sucker rod can be determined.

Working Barrels and Pumps

The committee has completed specifications for both cold drawn and machined working barrels and, after much effort, has developed a single set of standards for working barrel pump parts regardless of whether they are to be used in machined or cold drawn working barrels.

Figure 7, together with the following tabulation shows the general dimensions of standard A. P. I. cold drawn working barrels which are to be made in 2-inch, 2½-inch, 3-inch and 4-inch sizes:

Cold Drawn Working Barrels
All Dimensions in Inches at 68 Degrees Fahrenheit

Size of Working Barrel	Diameters: Nominal Outside "A"	Diameters: Inside "B"	Diameters: Tolerance	Threads: Number Threads Per Inch	Threads: Taper Inch Per Foot	Threads: Total Length of Thread—"C"	Length of Barrel "D"
2	2.375	1.7810	±.0082	11½	¾	1.625	See note below.
2	2.250	1.7810	±.0082	11½	⅜	1.375	See note below.
2	2.125	1.7810	± 0082	11½	⅜	1.375	See note below.
2½	2.75	2.2500	±.0082	11½	¾	1.625	See note below.
3	3.25	2.7500	±.0082	11½	¾	1.625	See note below.
4	4.25	3.7500	±.0102	11½	¾	1.625	See note below.

Note—For barrels of all diameters, lengths of 5, 6, 8 and 10 feet are considered standard. Lengths 4, 7, 9 feet and longer than 10 feet are considered special.

Special Note—The couplings at the ends of the barrels are considered as one unit of manufacture. The free end of couplings are threaded to A. P. I. standards.

Figure 8 and the following tabulation give details of A. P. I. machined working barrels which are also made in 2-inch, 2½-inch, 3-inch and 4-inch sizes:

MACHINED WORKING BARRELS
All Dimensions in Inches at 68 Degrees Fahrenheit Except Length "A"

Size of Working Barrel	Length "A" (in feet)	Inside: Diameter "B"	Inside: Tolerance	Outside Diameter Top and Bottom Regular Type Couplings "C"	Outside Diameter Top and Bottom Inserted Type Couplings "C"	Maximum Outside Diameter of Lower Coupling Extension Shoe "D"	Threads on Tubing End of Couplings To Be Standard A.P.I.	Standing Valve Seat: Bore Diameter "K"	Standing Valve Seat: Bore Diameter Tol.	Standing Valve Seat: Length of Taper "R"	Standing Valve Seat: Included Angle of Standing Valve Seat (degrees)
2	5, 6, 7, 9, 11, 15 and 20	1.750	+.0012 —.0002	3.25	2.875	2.875	Plain or Upset Tubing Thread	1.719	+.000 —.003	1.000	18
2½	"	2.250	+.0012 —.0002	4.00	3.500	3.500	"	2.219	+.000 —.003	1.125	18
3	"	2.750	+.0012 —.0002	4.50	4.000	4.000	"	2.719	+.000 —.003	1.250	18
4	By order to above lengths	3.750	+.0012 —.0002	5.50	5.000	5.000	"	3.719	+.000 —.003	1.375	18

Special Note—No outside diameter is specified for the shells of machined working barrels, as the shell is usually made from standard tubing. Top and bottom regular couplings may be threaded on tubing end to fit either plain or upset tubing with no change in outside diameter of the coupling, as specified in the above table. The inserted type coupling can only be threaded for plain tubing because the outside diameter of the inserted type coupling is less than the outside diameter of the corresponding upset tubing coupling which does not provide enough stock for an upset tubing joint. However, in small casing, barrels with inserted couplings can be used to advantage on upset tubing by providing sub-nipples to make the connection from upset to plain tubing threads. In ordering machined barrels, operators should bear in mind these facts, and specify accordingly.

The standing valve shoe shall have a taper of 18 degrees (including angle) for all sizes.

A. P. I. standards on both cold drawn and machined working barrels to a great extent represent present practice. The gradual change from present practice to A. P. I. standards will involve no difficulties on the part of the producer. The use of A. P. I. standard working barrels, however, is advantageous to the producers because such details as top and bottom coupling designs and dimensions, standing valve shoe dimensions, and the like, will be standard and interchangeable between makes. A. P. I. requirements as to tolerances, workmanship and finish are such that the use of standard A. P. I. working barrels will be advantageous to every operator and their introduction to the industry should be almost automatic. Practically all manufacturers of working barrels are already making or are planning to make them to A. P. I. specifications. The final specifications were ratified at the 1927 Colorado Springs meeting and are now ready for use.

Investigation showed a wide difference in dimensions of pump parts throughout the United States. Practically no two manufacturers had the same standards for types and pitch diameters of threads on cages, plunger nuts, cup plunger bodies, machined plungers, standing valve bodies, and the like. The committee apparently faced a hopeless task in developing a single set of standards from the large number of differing practices. However, with the splendid co-operation of oil well pump manufacturers, it was finally found possible to standardize eastern practice and western practice. To obtain a final standardization, the committee adopted eastern standards on 2-inch pumps, because of the large number of such pumps manufactured and in use in the eastern fields, and western practice for 2½-inch, 3-inch and 4-inch pumps, because of the numbers of these pumps used in California fields and the relatively small number of 2-inch pumps used in those fields. As with working barrels, the transition from old standards to new A. P. I. standards will be gradual but automatic and the advantages to the operator are many fold. For example, in the Gulf Coast fields of Texas, cup plunger pumps are used very widely, but in recent years Gulf Coast operators have been using machined plunger pumps in many wells. With the adoption of A. P. I. standards all pump fittings will be the same for both cup and machined plunger pumps, and workmen in the field will never encounter any delays and difficulties in changing the style of pump in a particular well. A single set of fittings carried in storehouses will do for both cup and machined plunger pumps. A similar condition is developing in California where, until recent months, machined plunger pumps were used almost exclusively. Now cup plungers are becoming popular and are being used in great numbers by many operators, and again the matter of interchangeability and simplicity of warehouse stocks is an important one to the operator.

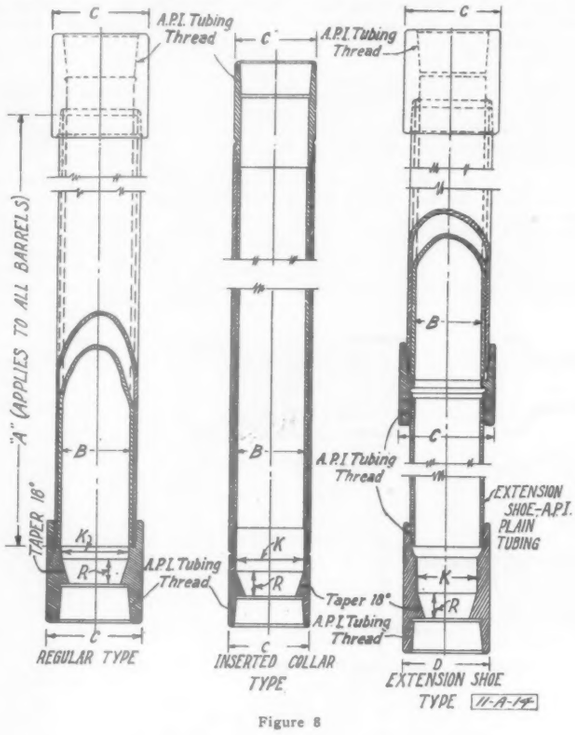


Figure 8

As with other pieces of A. P. I. equipment, the standards finally adopted represent present practice in so far as they are compatible with good engineering design, and the committee has no hesitation in recommending A. P. I. standards on working barrels and pump parts to the industry.

Internal Combustion Engines and Clutches

Because of the wide divergence of design in internal combustion engines, the committee found it difficult to standardize many mechanical parts. A. P. I. standards which were adopted relate to the size of bolt holes and foundation bolts for internal combustion engines of certain ratings. It was impossible to determine upon a standard layout of foundation bolts for engines of a certain rating because of the great differences in fundamental design by different manufacturers.

It was found possible, however, to design and specify dimensions of a clutch flange connection for internal combustion engines for oil field service and thus insure interchangeability between engines of any make and clutches of other makes. Figure 9 gives the details of the standard A.P.I. clutch and reverse gear connections, the actual dimensions being shown in the accompanying tabulation.

The committee feels that it has accomplished a very constructive piece of work in developing a standard method of rating internal combustion engines for oil field service. In short, the A. P. I. horsepower rating of horizontal single-cylinder gas, gasoline, or oil engines for oil field service is a double rating which expresses the average maximum brake horsepowers as developed by the engine at

(a) The recommended operating speed for pumping service, and

(b) The tested speed of maximum power.

Figure 10 shows the standard A. P. I. rating test form and for purposes of illustration a typical engine rating curve has been drawn on the cross-section graph. This curve represents the brake horsepower developed by a particular engine at speeds varying from 125 to 305 r.p.m. The intersection of ordinate "A" with the brake horsepower curve gives the rating "A" at the recommended operating speed for pumping service, while the intersection of ordinate "B" with the brake horsepower curve gives the rating "B," which is at the speed of maximum power. In addition, manufacturers are asked to show on the graph the tested maximum speed illustrated by ordinate "C" and the tested minimum speed at which the governor will function, illustrated by ordinate "D," Figure 10. Other engineering data necessary for a fair appraisal of an engine's performance are called for on the standard rating test form, Figure 10.

Appraising Values

The object of the A. P. I. in developing a standard method and code of internal combustion engines is to provide the purchaser with a method of appraising the comparative values of several engines in terms of dollars per horsepower for example, and also to enable him to determine the limits of speed and power of several engines which might be offered for sale. Before adopting the A. P. I. rating method, it was found that one advertised 40 horsepower engine, for example, might develop 40 horsepower at some particular speed. The purchaser believed he was buying a 40 horsepower engine, but actually did not know at what speed the engine would develop 40 horsepower. Neither did he know how fast the engine would run or what power it would develop while running at maximum speed, both of which are important in operations of pulling rods and tubing. To complicate matters, a second engine salesman might offer a so-called 40 horsepower engine for sale, and the prospective purchaser had no way of knowing at what speed the second engine would develop 40 horsepower or what its maximum power and speed would be. Actual brake horsepower tests

KELLOGG PRODUCTS
For Petroleum Industry

CROSS CRACKING PLANTS: For cracking any stock—crude, fuel oil, gas oil, or kerosene. A strictly liquid phase digestion process which, by avoiding vaporization until the cracking reaction is completed, assures the greatest possible conversion.

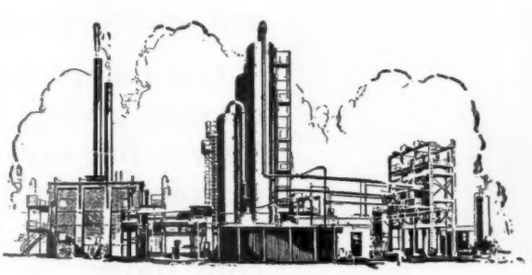
PIPE STILLS: For capacities up to and exceeding 10,000 barrels a day. Uniform distribution of heat around pipe coils. Adequate provision for flexibility in working temperatures and pressures.

BUBBLE TOWERS: Designed and constructed to give perfect fractionation—as affirmed by the temperature gaps between cuts.

GRAY TREATING TOWERS: Passing cracked gasoline in the vapor phase through Gray Towers produces a gasoline ready for the market except for sweetening, and saves the large fraction ordinarily lost in rerunning and acid treating.

TREATING PLANTS: Complete plants for treating crude naptha and pressure distillate in order to remove undesirable sulphur compounds, and the objectionable odors and discolorations which such compounds would otherwise impart to the product.

HEAT EXCHANGERS: Condensers, coolers and heat exchangers to meet any refinery requirements.



THE M. W. KELLOGG CO., 7 DEY STREET — NEW YORK

KANSAS CITY, MO., 700 BALTIMORE AVE. — SAN FRANCISCO, CAL., 444 MARKET ST.
LOS ANGELES, CAL., 329 PETROLEUM SECURITIES BLDG.

KELLOGG

A He-Man's Valve *for a* He-Man's Job

STANDARD, medium and extra heavy O. I. C. Valves for steam, oil, water or gas cover the complete range of sizes from 2 to 16 inches, inclusive. Their long life, ease of operation and trouble-free service pay dividends far in excess of their slight additional cost.

The No. 100 O. I. C. standard brass gate valve illustrated at the left, for example is equipped with double wedge gate and rising valve stem of larger diameter and greater thread contact than ordinarily considered sufficient. Standard Acme threads increase the strength and operating ease of this superior valve.

Our completely illustrated, 277 page catalog giving full details of O. I. C. Valves for every requirement of the petroleum industry, will be sent promptly on request. Better write for your copy today.

OIC

THE OHIO INJECTOR COMPANY

WADSWORTH, OHIO

O. I. C. Valves are Carried in Stock and Distributed in the Mid-Continental Field by International Supply Company, Tulsa, Oklahoma and Branches.

on a number of so-called 40 horsepower engines in common use in the fields showed that the ranges of power of engines varied by as much as 33⅓ per cent. All of these engines are advertised and sold as 40 horsepower engines, although, as might be expected, it was observed that the more powerful engines sold at higher prices. Such a confusing situation causes the ordinary oil operator to wonder what kind of an engine he actually needs and what particular engine will best fit his needs.

A producer who is using engines on a beam pumping well is interested chiefly in two points; first, the power which his engine will develop at the normal pumping speed, and second, the maximum power that the engine will develop and at what speed, because the latter condition is met in pulling rods and tubing.

In fields where from 4,000 to 5,000 feet of tubing is pulled, an engine necessarily must deliver considerable power and deliver it at a reasonably high rotational speed above the pumping speed in order to permit pulling and rerunning tubing as fast as possible. It is evident, of course, if the purchaser is not furnished with a speed-horsepower curve that he has no way of knowing whether a cheap so-called "40-horsepower engine" is a better "buy" for him than a more expensive so-called "40."

With this in mind, the committee with the co-operation of the gas engine manufacturers worked out the system of standardized ratings for single-cylinder, horizontal, internal combustion engines adopted by the A. P. I. This system requires every manufacturer of gas engines to present to a prospective purchaser a test record form showing among other things a characteristic speed-horsepower curve, which will represent the horsepower that the engine will develop on the test block at the factory.

This curve may not show the exact horsepower, of course, that the engine will develop in the field, because there are a great many variable conditions such as the quality of gas, temperature, intake fuel pressure, altitude and the like that may vary the horsepower. However, with the data called for by the A. P. I. test record form, allowance can be made for differences in conditions, and a fairly equitable comparison of results of field and factory tests may be obtained.

Miscellaneous Items of Equipment

The committee has adopted standards on several miscellaneous items of equipment and is now working on standards for still other pieces of pumping equipment such as oil field motors.

At the 1927 Colorado Springs meeting, the committee made recommendations to oil operators regarding the standardization of pressure gauge taps and fittings at well heads. This recommendation is of much concern to every operator of flowing and gas lift wells, and is called particularly to the attention of oil operators at this time.

Pressure gauge manufacturers follow different practices with regard the size and kind of connections furnished on pressure gauges. It frequently happens that gauges are delivered for use at wells with one-quarter inch, three-eighths inch or one-half inch connections and the connections may be male, female or even unions. As pressure gauges are usually needed at times of stress when flowing or gas lift wells are being worked upon, and as necessary bushings are seldom available at the wells for making connections, the committee formulated the following recommendations to oil producers to eliminate all confusion and delay:

1. All taps and pressure gauge connections at well heads, including taps and connections for bleeders, are to be one-half inch standard pipe size.

2. All pressure gauges are to be fitted with bushings to give one-half inch male pipe connection before being delivered by storehouse to the field.

3. All gauges are to be fitted with valve or stopcock immediately under gauge before being delivered by storehouse to the field.

Compliance with these recommendations will eliminate all confusion in regard to the fitting of pressure gauges and will not interfere with gauge manufacturers' designs.

At the present time the committee is actively engaged on development of standards of motor foundations, shaft heights and positions, and other motor dimensions, as well as upon the preparation of codes of care and use of A. P. I. equipment. At the Chicago meeting several important matters will be discussed and additional standards should be ready as a result of that meeting.

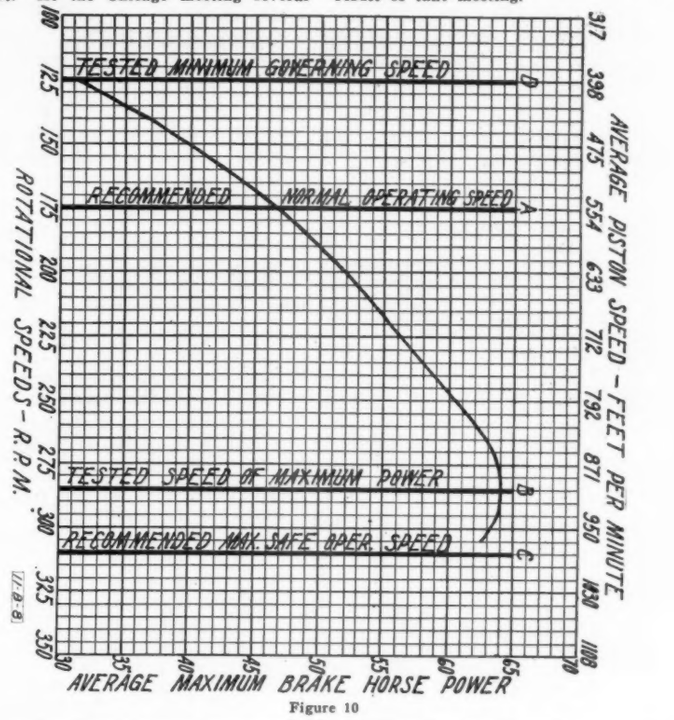

TESTED MINIMUM GOVERNING SPEED
RECOMMENDED NORMAL OPERATING SPEED
TESTED SPEED OF MAXIMUM POWER
RECOMMENDED MAX. SAFE OPER. SPEED
ROTATIONAL SPEEDS - R.P.M.
AVERAGE PISTON SPEED - FEET PER MINUTE
AVERAGE MAXIMUM BRAKE HORSE POWER
11-8-8

Figure 10

COLD DRAWN AND MACHINED WORKING BARREL SPECIFICATIONS

A.P.I. Specifications for Cold Drawn and Machined Working Barrels for Oil Well Pumping

These specifications were prepared by the Special A.P.I. Committee on the Standardization of Pumping Equipment and Engines.

Four sizes of working barrels are designated as standard. These are known nominally as 2, 2½, 3 and 4-inch sizes and the nomenclature applies to both cold drawn and sectional machined working barrels for oil field use.

Section 1—Material Covered

1-a. These specifications apply both to cold drawn and machined barrels as used for pumping oil wells.

1-b. These standards are dimensional only and apply to new material. The specifications do not include chemical or physical properties of materials.

Section 2—Workmanship and Finish

2-a. All mechanical surfaces shall be finished in a good and workmanlike manner and shall be free from burrs, rough edges, tool marks, and the like.

2-b. When A.P.I. Standard Tubing threads are specified, they shall be manufactured and gauged as specified in the latest edition of A.P.I. standards No. 5-A: "A.P.I. Pipe Specifications."

2-c. The inside diameter of all Cold Drawn Working Barrels shall be checked the entire length with gauges manufactured in accordance with dimensions given in Table 2 and in Figure 2. The inside diameter of all machined working barrels shall be checked the entire length with "Go" gauges manufactured in accordance with dimensions given in Table 6 and Figure 6.

2-d. The "Go" and "No Go" gauges shall be separate pieces.

Section 3—Marking

3-a. Working barrels, cold drawn or machined, manufactured in conformity with these specifications shall be marked with the manufacturer's name or private identifying mark, size of barrel and the A.P.I. monogram; size of A.P.I. monogram to be one-fourth inch high.

3-b. The size of the barrel and the A.P.I. monogram shall be applied by a steel stencil and shall be placed approximately 1 foot from the upper coupling.

3-c. The upper and lower couplings shall be stamped (by a steel stencil) with the size of the A.P.I. standard tubing threads with which it connects, and the A.P.I. monogram, size of letters to be one-fourth inch high; for example, a 3-inch working barrel with coupling threads to fit 3-inch A.P.I. tubing should be stamped as follows:

On the barrel:

3-inch A. B. Co.
(or mark)

On the upper and lower couplings:

For plain tubing = 3-inch — 11½.
For upset tubing = 3-inch — 10 UP.

3-d. No working barrels shall be marked with the A.P.I. monogram that do not comply with these specifications. Authority to use the A.P.I. monogram will be granted in accordance with the rules and conditions contained in the appendix.

3-e. The use of the A.P.I. monogram on the coupling is only to indicate that the tubing-end threads are manufactured in accordance with A.P.I. Tubing Standards, and does not imply that the threads on the working barrel end are interchangeable.

Section 4—Cold Drawn Working Barrels

4-a. Cold drawn working barrels manufactured in accordance with dimensions shown in Table 1 and Figure 1 are standard. These dimensions shall also apply to the old "Eastern" type of reamed cast iron working barrel which is of full length, but they shall not apply to sectional liner machined working barrels which are specified in Section 6.

Section 5—Couplings for Cold Drawn Barrels

5-a. Top and bottom couplings shall be threaded on one end to conform with the working barrel thread as described in Table 1, and shall be threaded on the other end to conform to A.P.I. tubing standards, especially as described in Figures 3 and 4 and Tables 3 and 4.

5-b. The bottom coupling for cold drawn working barrels shall provide a seat for the standing valve with a taper of 18 degrees essentially as shown by Figure 4.

5-c. Couplings shall be considered as a unit with the barrel. Threads in the top and bottom couplings that connect to the working barrel are specified in Table 1, but no gauges are necessary for this connection. However, as taper, pitch, and length of thread are all given in Table 1, manufacturers should make the same thread and it should be possible to interchange couplings with sufficient accuracy without the use of master gauges,

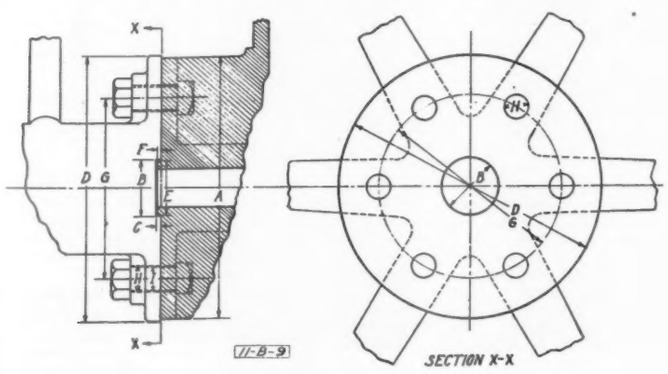


Figure 9

A. P. I. STANDARD DIMENSIONS FOR REVERSIBLE CLUTCH AND ENGINE FLY WHEEL FLANGE CONNECTIONS

Class of Engines Adapted to	Clutch		Reverse Gear Connections		Fly Wheel Connections						
A.P.I. Rating at Normal Pumping Speed*	Designation of Clutch Flange	Diameter of Flange	Diam. of Female Recess	Depth of Female Recess	Diam. of Flange	External Diam. of Male Projection	Length of Male Projection	Diam. of Bolt Circle	Size of Bolt Hole	Size of Bolt	No. of Bolts (Equally Spaced)
	A		B	C	D	E	F	G	H	I	
35 h.p. and under	A.P.I. 12"	12"	6.003"	1/4"	12"	6.000"	3/16"	10-1/4"	57/64"	7/8"	6
Above 35 h.p.	A.P.I. 16"	16"	7.254"	9/32"	16"	7.250"	7/32"	13-1/4"	1-1/64"	1"	6

Note—An adapter or sub can be made to fit new A. P. I. flanges to old style clutch flanges.
*Rating "A," see Figure 10.

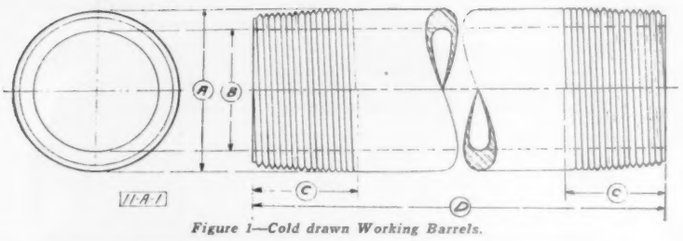


Figure 1—Cold drawn Working Barrels.

although perfect interchangeability cannot be guaranteed.

5-d. The outside diameter of couplings shall be that of the A.P.I. tubing connection specified. The length of top collar shall be that of the corresponding A. P.I. tubing collar. The length of bottom collar shall be shown as in Table 4 and Figure 4.

Special Note: Since the couplings and their connections to the working barrel are considered as one unit, it is not essential that any recess be specified in the ends which screw onto the working barrel. It is recommended, however, that the last two threads be beveled and no recess used. This is the present standard used by all manufacturers for drawn working barrels.

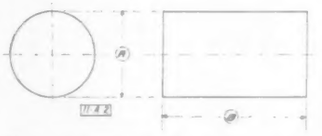


Figure 2—Gauge for cold drawn working barrels.

TABLE 1
COLD DRAWN WORKING BARRELS
See Figure 1
All Dimensions in Inches at 68 Degrees Fahrenheit.

Size of Working Barrel	Diameters			Threads			Length of Barrel "D"
	Nominal Outside "A"	Inside "B"	Inside Tolerance	Number Threads Per Inch	Taper Inch Per foot	Total Length of Thread—"C"	
2	2.375	1.7810	±.0082	11½"	¾	1.625	See Note below
2	2.250	1.7810	±.0082	11½"	⅜	1.375	See Note Below
2	2.125	1.7810	±.0082	11½"	⅜	1.375	See Note Below
2½	2.75	2.2500	±.0082	11½"	¾	1.625	See Note Below
3	3.25	2.7500	±.0082	11½"	¾	1.625	See Note Below
4	4.25	3.7500	±.0102	11½"	¾	1.625	See Note Below

Note: For barrels of all diameters, lengths of 5, 6, 8 and 10 feet are considered standard. Lengths of 4, 7, 9 feet and longer than 10 feet are considered special.

Special Note: The couplings at the ends of the barrels are considered as one unit of manufacture. The free end of couplings are threaded to A.P.I. standards as specified in Tables 3 and 4.

TABLE 2
GAUGES FOR COLD DRAWN BARRELS
See Figure 2
All Dimensions in Inches at 68 Degrees Fahrenheit.

Size of Working Barrel	Permissible Limits on Inside Diameter of Product		Inspection Gauges—Permissible Limits					
			"Go" Gauge			"No Go" Gauge		
			Diameter		Length	Diameter		Length
	Max.	Min.	"A"	Tol.	"B"	"A"	Tol.	"B"
2	1.7892	1.7728	1.7728	+.0002 −.0000	3	1.7892	+.0000 −.0002	2
2½	2.2582	2.2418	2.2418	+.0002 −.0000	3	2.2582	+.0000 −.0002	2
3	2.7582	2.7418	2.7418	+.0002 −.0000	3	2.7582	+.0000 −.0002	2
4	3.7602	3.7398	3.7398	+.0002 −.0000	3	3.7602	+.0000 −.0002	2

Special Note: "Go" and "No Go" Gauges shall be separate pieces. Long handles may be attached to the "Go" gauges for checking entire length of barrel.

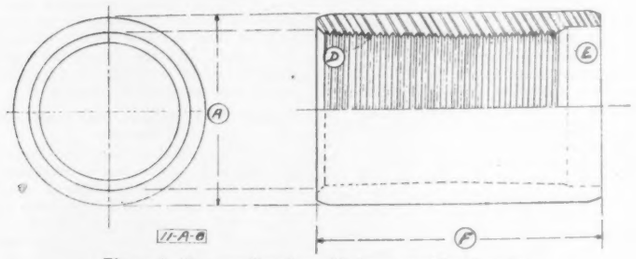


Figure 3—Top coupling for cold drawn working barrels.

TABLE 3—TOP COUPLINGS
See Figure 3
All dimensions in inches at 68 degrees Fahrenheit.

Size of Working Barrel	Nominal O. D.	Outside Diameter		Length	Threads	
		For Standard Tubing—"A"	For External Upset Tubing "A"	"F"	"E"	"D"
2	2.375	2.870	3.0600	Same as A.P.I Tubing Couplings	A.P.I. Tubing Standards	Unit with Working Barrel See Table 1
2	2.250	2.870	3.0600	"	"	
2	2.125	2.870	3.0600	"	"	
2½	2.750	3.517	3.6680	"	"	
3	3.250	4.200	4.5040	"	"	
4	4.250	5.216	5.5625	"	"	

In order to secure the proper top collar, orders must specify whether the pump is for use on Plain or Upset A.P.I. Tubing. When not specified A.P.I. Plain Tubing is understood and the pump will be so furnished.

A.P.I. Tubing Standards are to be used in designing the upper end of the couplings.

The bottom end of the coupling is to be threaded to fit the working barrel as shown in Table 1. No recess is required in this end but two or three beveled threads are to be used. This end of coupling is considered as a unit with the working barrel and no master gauges are necessary.

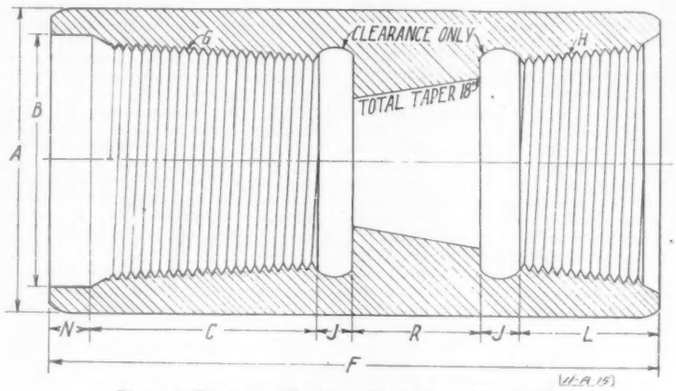


Figure 4—Bottom coupling for cold drawn working barrels.

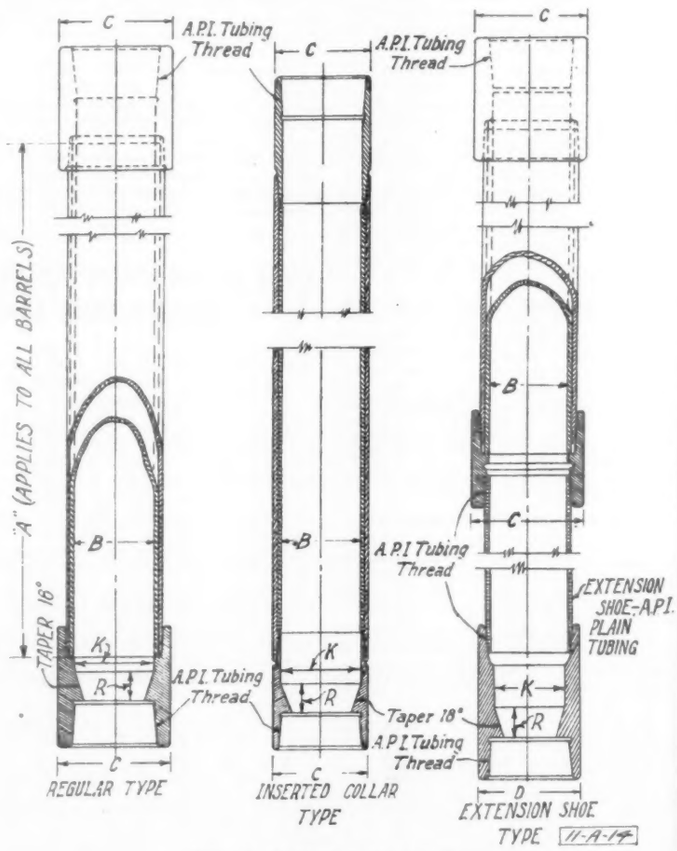


Figure 5—Machined working barrels.

Note to Table 4—The lower thread "G" on bottom coupling to fit A.P.I. tubing specified. In order to secure proper bottom collar, purchaser must specify whether plain or upset connection is required. Unless specifically specified otherwise, plain tubing connection will be furnished. Note that thread lengths in column "C" are for plain tubing only. When ordering for Upset, the threads are slightly longer.

The top end of the collar to be threaded to fit the working barrel as shown in Table 1. No recess required in this end of coupling, but two or three beveled threads are to be used. This end of coupling is considered as a unit with working barrel and no master gauges are necessary.

Section 6—Machined Working Barrels

6-a. Machined working barrels manufactured in accordance with dimensions shown in Table 5 and Figure 5 shall be considered standard. For the purpose of this specification, machined working barrels, including couplings, are considered as one unit. On account of variations in designs of machined working barrels, the internal diameters of the barrels and the dimensions of the couplings only are specified as shown in Table 5 and in essential details by Figure 5.

Section 7—Inspection and Rejection

7-a. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material specified hereinbefore. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. Any inspection made at the place of manufacture shall be considered process inspection, and shall be so conducted as not to interfere unnecessarily with the operation of the works. The manufacturer

Pipe ... for every purpose, ready for spot shipment from yard stocks

IN TULSA and St. Louis the Greenspon yards are stocked with pipe awaiting your needs. In St. Louis alone there are approximately 100 miles of new and used pipe on hand, ready to be loaded by our giant overhead cranes.

ODEE Pipe for gas lines, double-jointed with Bull-Dog Welds, not only effects a great saving in price but enables you to reduce your welding cost in the field by at least 50% and to complete the installation in less time.

Phone, wire, or write our nearest office for quotations. Inquire about our extended term payment plan.

ODEE PIPE FOR GAS LINES

Jos. GREENSPON'S Sons
IRON & STEEL COMPANY
St. Louis, Mo. Tulsa, Okla.

Are You Interested In Figures?

PERFECTO Low-Pressure GAS BURNERS were first designed, about two years ago, to utilize gas pressures so low that no other gas burner could successfully operate.

Initial tests proved their efficiency, and during the past two years thousands of PERFECTO Low-Pressure Gas Burners have been installed by practically all of the leading oil-producing companies. A steady stream of repeat orders from these Companies is the best evidence that PERFECTO does the work for which it was designed.

TWENTY OUT OF THE TWENTY-FIVE LEADING OIL PRODUCERS IN OKLAHOMA, IN 1927, ARE *ALL* LARGE USERS OF PERFECTO LOW PRESSURE GAS BURNERS.

PERFECTO Low Pressure Gas Burners will develop, *and hold*, a working head of 150 pounds of steam, on as little as one pound of gas pressure.

They have been used on as high as six drilling jobs, without reflueing the boilers.

Although some of these burners have been in constant use for over two years, there has never been a single proven instance where a PERFECTO has blistered a crown sheet or side sheet of any boiler. That's real Boiler Saving.

PERFECTO Low Pressure Gas Burners burn with a clear blue flame —producing the Highest Possible Heating Efficiency. This heat is distributed evenly over the entire fire-box—where it belongs.

PERFECTO is built in "unit" form—you can buy the exact number of units necessary to meet any given requirements.

PERFECTO is silent in operation—simple—with no delicate adjustments to cause expensive shut-downs and repairs. Combustion takes place completely in the fire box—no chance of gas burning in the flues.

See our display at the Tulsa Petroleum Exposition—Texas Building. Our representatives will be there to greet you, and gladly answer any questions regarding PERFECTO Low Pressure Gas Burners.

Now Being Used Extensively by Twenty out of the Twenty-five Leading Oil Producing Companies in Oklahoma

Perfecto is patented in the U. S. A., India and Canada. Made and sold by

THE P. J. SONNER GAS BURNER COMPANY

WINFIELD, KANSAS

Sales and Service at

Tulsa, Okla. Los Angeles, Calif. Borger, Texas
Shawnee, Okla. El Dorado, Ark. Wichita Falls, Texas

Mid-Continent Distributors for Wilgus Regulators, and other Wilgus Products

We also manufacture PERFECTO Low Pressure Burners for Household Use.

TABLE 4
BOTTOM COUPLING FOR COLD DRAWN BARRELS
See Figure 4
All Dimensions in Inches at 68 Degrees Fahrenheit.

Size of Working Barrel	Nominal O. D.	Outside Diameter "A" Standard Tubing	Outside Diameter "A" Upset Tubing	Total Length of Coupling "F"	Total Length Threads Lower End "C"	Total Length Threads Upper End "L"	Clearance Ends of Taper "J"	Length Recess Bottom End "N"	Standing Valve Seat Dimensions: Large Bore Diameter "K"	Standing Valve Seat Dimensions: Length "R"	Standing Valve Seat Dimensions: Total Angle of Standing Valve Seat Degrees
2	2.375	2.870	3.0600	5.0000	1.2500	1⅛	⅝	⅛	1.719	1.000	18
	2.25	2.870	3.0600								18
	2.125	2.870	3.0600								18
2½	2.75	3.517	3.6680	5.5625	1.6875	1½	⅝	⅛	2.219	1.125	18
3	3.25	4.200	4.5040	5.9375	1.9375	1½	⅝	⅛	2.719	1.250	18
4	4.25	5.216	5.5626	6.3125	2.1875	1½	⅝	⅛	3.719	1.375	18

See Note to Table 4.

TABLE 5
MACHINED WORKING BARRELS
See Figure 5.
All Dimensions in Inches at 68 Degrees Fahrenheit except in Length "A"

Size of Working Barrel	Length "A" (in feet)	Inside Diameter "B"	Inside Tolerance	Outside Diameter Top and Bottom Regular Type Couplings "C"	Outside Diameter Top and Bottom Inserted Type Couplings "C"	Maximum outside Diameter of Lower Coupling Extension Shoe "D"	Threads on Tubing End of Couplings	Standing Valve Seat: Bore Diameter "K"	Standing Valve Seat: Tolerance	Standing Valve Seat: Length of Taper "R"	Standing Valve Seat: Included Angle of Standing Valve Seat (degrees)
2	5, 6, 7, 9, 11, 15 and 20	1.750	+.0012 −.0002	3.25	2.875	2.875	To be Standard A.P.I. Plain or Upset Tubing Thread	1.719	+.000 −.003	1.000	18
2½	20	2.250	+.0012 −.0002	4.00	3.500	3.500	Thread	2.219	+.000 −.003	1.125	18
3	20	2.750	+.0012 −.0002	4.50	4.000	4.000	Thread	2.719	+.000 −.003	1.250	18
4	By order to above lengths	3.750	+.0012 −.0002	5.50	5.000	5.000	Thread	3.719	+.000 −.003	1.375	18

Special Note: No outside diameter is specified for the shells of machined working barrels, as the shell is usually made from standard tubing. Top and bottom regular couplings may be threaded on tubing end to fit either plain or upset tubing with no change in outside diameter of the coupling, as specified in the above table. The inserted type coupling can only be threaded for plain tubing because the outside diameter of the inserted type coupling is less than the outside diameter of the corresponding upset tubing coupling which does not provide enough stock for an upset tubing joint. However, in small casing, barrels with inserted couplings can be used to advantage on upset tubing by providing subnipples to make the connection from upset to plain tubing threads. In ordering machined barrels, operators should bear in mind these facts, and specify accordingly.

The standing valve shoe shall have a taper of 18 degrees (included angle) for all sizes.

shall supply the purchaser with gauges, the accuracy of which shall be proved to the satisfaction of the purchaser.

7-b. Material manufactured under these specifications which proves to be defective subsequent to acceptance may be rejected and the manufacturer shall be notified.

7-c. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A. P.I. material. When material stamped or marked with the A.P.I. monogram is rejected, such monogram shall be canceled as follows:

7-d. On cast material the loop in the letter "P" shall be chipped off.

7-e. On forged material, a steel canceling stencil, one-half inch square, shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

TABLE 6
GAUGES FOR MACHINED WORKING BARRELS
See Figure 6
All Dimensions in Inches at 68 Degrees Fahrenheit.

Size of Working Barrel	Permissible Limits on Inside Diameter of Product Max.	Permissible Limits on Inside Diameter of Product Min.	Inspection Gauges—Permissible Limits: "Go" Gauge Diameter "A"	"Go" Gauge Tolerance	"Go" Gauge Length "B"	"No Go" Gauge Diameter "A"	"No Go" Gauge Tolerance	"No Go" Gauge Length "B"
2	1.7512	1.7498	1.7498	+.0002 −.0000	12	1.7512	+.0000 −.0002	3
2½	2.2512	2.2498	2.2498	+.0002 −.0000	12	2.2512	+.0000 −.0002	3
3	2.7512	2.7498	2.7498	+.0002 −.0000	12	2.7512	+.0000 −.0002	3
4	3.7512	3.7498	3.7498	+.0002 −.0000	12	3.7512	+.0000 −.0002	3

Special Note: "Go" and "No Go" gauges shall be separate pieces, and the entire length of machined liners shall be checked with the "Go" gauge.

AMERICAN PETROLEUM INSTITUTE SUCKER ROD SPECIFICATIONS

SECTION 1
Material Covered

1-a. These specifications cover sucker rod joints, are dimensional only, and apply to new material. Chemical and physical properties of materials are not included.

SECTION 2
Workmanship and Fin'sh

2-a. All machined surfaces shall be finished in a good and workmanlike manner and shall be free from burrs, rough edges, etc.

2-b. All forging shall be free from injurious defects and shall have a workmanlike finish.

SECTION 3
Marking

3-a. Sucker rods with joints and couplings manufactured in accordance with these specifications shall be stamped on the wrench square with the official A.P.I. monogram, the manufacturer's name or identifying mark, and the nominal size of the rod, as stipulated hereinafter. Sucker rods that do not comply with these specifications shall not be marked with the A.P.I. monogram.

3-b. Authority to use the A.P.I. monogram will be granted in accordance with the conditions contained in the appendix.

3-c. The A.P.I. monogram shall be applied with a steel stencil, size of monogram to be five-sixteenths inch high.

SECTION 5
Threads and Contact Dimensions

5-a. Thread Form: The form of thread for A.P.I. standard sucker rod joints shall be the American (National) standard screw thread according to the report of the National Screw Thread Commission approved August 19, 1924, and published in Bureau of Standards Bulletin No. 61, February 11, 1925.

5-b. The perfect threads for A.P.I. standard sucker rod joints are straight, formed on the surface of a cylinder. The imperfect threads shown are a continuation of the straight threads and are tapered within the clearance limits defined by the cones specified.

5-c. Profile: The basic angle of thread between the sides of the thread measured in an axial plane is 60 degrees. The line bisecting this 60-degree angle is perpendicular to the axis of the thread.

5-d. Pitch: The number of threads per inch is 10, making the pitch equal to 0.10 inch, measured in a direction parallel to the axis of the thread.

5-e. Thread Sizes: The threads for A.P.I. standard sucker rods shall be as specified in Tables 2 and 3, and Figure 2. The root of the pin threads only shall be rounded between the limiting radii of .01083 inch and .01443 inch. The thread values in Tables 2 and 3, and Figure 2, are basic. The thread tolerances are in accordance with the limits of pitch diameters specified, which permits an allowance of .0010 inch between pitch diameter of the maximum pin and minimum box, (see Figure 3) and .0020-inch tolerance in pitch diameter of each pin and box. The tolerances specified are based on Class Four fit, as stipulated by the National Screw Thread Commission.

5-f. Contact Dimensions: The contact dimensions for A.P.I. standard sucker rod joints shall be as specified in Table 5 and Figure 4, and as further explained hereinafter.

Pin: 5-g. The pin cylinder shall have the diameters "DP" as shown in Table 5.

5-h. The fillet "RP" joining the pin cylinder and the pin shoulder contact face shall be made with a radius of 3/32 inch

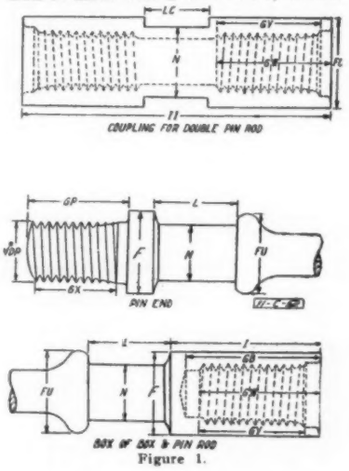


Figure 1.

TABLE NO. 1
SUCKER ROD DIMENSIONS
See Figure 1.
All Dimensions in Inches at 68 Degrees Fahrenheit

Size of Rod	Nominal Outside Dia. of Pin † "NDP"	Outside Dia. of Collar and Box ‡ "F"	Outside Dia. of Coupling Double Pin Rod "FC"	Length of Pin "GP"	Length of Box on Box & Pin Rod "I"	Total Depth of Box on Box & Pin Rod "GB"	Length of Wrench Sq. on Box & Pin of Box & Pin Rod "L"	Length of Wrench Sq. on Coupling Double Pin Rod "LC"	Dia. of Upset Shoulder on Pin and Box "FU"	Width of Wrench Square: Hollow Coupling, Square or Flat "N"	Width of Wrench Square: Pin & Box and Solid Coupling "N"	Min. Length of Coupling Double Pin Rod "H"
⅝	⅝	1⅜	1½	1.1250 +.0600 −.0000	2⅛ Min.	1⅝	1¼	1¼	Not to Exceed	1⅜ ±1/32	1 ±1/32	4
¾	1 1/16	1½	1½ or 1⅝*	1.3750 +.0600 −.0000	2⅝ Min.	1⅞	1½	1¼		1⅜ ±1/32	1 ±1/32	4
⅞	1 5/16	1 11/16	1 13/16	1.3750 +.0600 −.0000	2⅝ Min.	1⅞	1½	1¼	"F"	1⅜ ±1/32	1 ±1/32	4

*Optional and must be specified by purchaser—1½-inch O. D. for 2-inch tubing and 1⅝-inch O. D. for larger sizes of tubing.
†This dimension nominal only; see Figures 2 and 3, and Tables 2 and 4, for exact thread diameters.
‡Dimension "F" applies to the following: (a) Outside diameter of box for Box and Pin Rod. (b) Outside diameter of pin collar for Box and Pin Rod. (c) Outside diameter of pin collar for Double Pin Rod.

TABLE 2
SUCKER ROD PIN THREAD DIMENSIONS
See Figure 2
All Dimensions in Inches at 68 Degrees Fahrenheit

Nominal Size of rod	No. Threads Per Inch	Pitch Diameter	* Major Diameter	* Minor Diam. (Root truncation arched)	Length Imperfect Threads (Shoulder end)	Total Length Threads (Minimum)	Length Perfect Threads	Thread Height Truncated
	"B"	"CP"	"DP"	"dP"	"eP"	"GX"	"EP"	"h"
⅝	10	.87200	.93695	.81427	.4	.97	.57	.06134
		+.0000	+.0000	+.0000			+.06	
		—.0020	—.0128	—.0092			—.00	
¾	10	.99700	1.06195	.93927	.4	1.22	.82	.06134
		+.0000	+.0000	+.0000			+.06	
		—.0020	—.0128	—.0092			—.00	
⅞	10	1.12200	1.18695	1.06427	.4	1.22	.82	.06134
		+.0000	+.0000	+.0000			+.06	
		—.0020	—.0128	—.0092			—.00	

*Crest and root diameters obtained from basic theoretical thread height, after truncation, of .0649519 inch.

SUCKER ROD THREADS

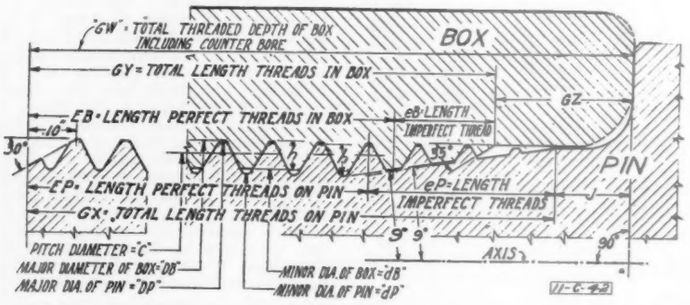


Figure 2.

TABLE 3
SUCKER ROD BOX THREAD DIMENSIONS
See Figure 2
All Dimensions in Inches at 68 Degrees Fahrenheit

Nominal Size of Rod	No. Threads per Inch	Pitch Diameter	* Major Dia. (Threads Truncated flat)	* Minor Dia. (Threads Truncated flat)	Threaded Depth of Box Counterbore (Minimum Values)	Total Length Threads in Box	Length Imperfect Threads	Length Perfect Threads	Thread Height (Truncated)
	"B"	"CB"	"DB"	"dB"	"GW"	"GY"	"eB"	"EB"	"h"
⅝	10	.87300	.93795	.82970	1.29	1.06	.27	.79	.05413
		+.002	+.0164	+.0108				+.06	
		—.000	—.0000	—.0000				—.00	
¾	10	.99800	1.06295	.95470	1.54	1.31	.27	1.04	.05413
		+.002	+.0164	+.0108				+.06	
		—.000	—.0000	—.0000				—.00	
⅞	10	1.12300	1.18795	1.07970	1.54	1.31	.27	1.04	.05413
		+.002	+.0164	+.0108				+.06	
		—.000	—.0000	—.0000				—.00	

*Crest and root diameters obtained from basic theoretical thread height, after truncation, of .0649519 inch.

TABLE 4
THREAD CLEARANCES AND TOLERANCES
See Figure 3
All Dimensions in Inches at 68 Degrees Fahrenheit

	Size of Rod ⅝	¾	⅞
Max. Box Major Dia.="DB"+.0164 inch	.95435	1.07935	1.20435
Min. Box Major Dia.="DB"	.93795	1.06295	1.18795
Max. Pin Major Dia.="DP"	.92695	1.06195	1.18695
Min. Pin Major Dia.="DP"—.0128 inch	.92415	1.04915	1.17415
Max. Box Pitch Dia.="CB"+.002 inch	.87500	1.00000	1.12500
Min. Box Pitch Dia.="CB"	.87300	.99800	1.12300
Max. Pin Pitch Dia.="CP"	.87200	.99700	1.12200
Min. Pin Pitch Dia.="CP"—.002 inch	.87000	.99500	1.12000
Max. Box Minor Dia.="dB"+.0108 inch	.84050	.96550	1.09050
Min. Box Minor Dia="dB"	.82970	.95470	1.07970
Max. Pin Minor Dia.="dP"	.81427	.93927	1.06427
Min. Pin Minor Dia.="dP"—.0092 inch	.80507	.93007	1.05507

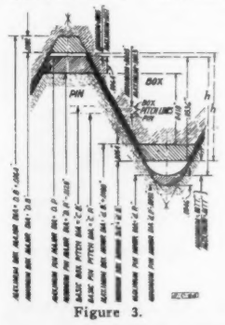


Figure 3.

for all sizes of rods. The fillet "RP" shall become tangent to the pin shoulder contact face at a minimum diameter "mP" (See Table 5). There shall be a chamfer "QP" or rounding of the pin collar at the outer edge of the contact face, which shall not decrease the major diameter of the pin contact face by more than 1/32 inch, or 1/64 inch on the radius.

5-i. The roots of the last threads on the pin shall conform to a cone having an included angle of 18 degrees, and whose larger base starts at a distance "J," equal to .156 inch from the shoulder face, with the base diameter "kP" within the limits specified in Table 5.

5-j. The first thread on the pin shall be chamfered at an angle of 30 degrees to the axis of the pin.

Box: 5k. The box shall be counterbored a distance "GZ," equal to 0.20 inch to 0.23 inch deep, and of diameter "KB" given in Table 5. The inner end of the box counterbore shall be chamfered at an angle of 35 degrees to the axis of the box.

5-l. The definite shape of the outer chamfer "QB" on the box shall be at the manufacturer's option, but shall not decrease the major diameter of the box contact face to a value less than the outside diameter "F" of the pin collar. The definite shape of the inner chamfer "RB" in the box shall be at the manufacturer's option, but shall not reduce the minor diameter of the box contact face to a value less than "mP." (See Table 5.)

5-m. There shall be no contact between pin fillet "RP" and box chamfer "RB."

5-n. The crests of the first threads in the box shall be chamfered to a cone, having an included angle of 18 degrees, and which shall conform to the corresponding pin cone. The base of this box thread cone shall start at a distance "J," equal to .156 inch from the shoulder face with a base diameter "kB" within the limits specified in Table 5.

TABLE 5
SUCKER ROD JOINT CONTACT DIMENSIONS
See Figure 4.
All Dimensions in Inches at 68 Degrees Fahrenheit

Size of Rod	Min. Dia. of Box & Pin Contact Faces	Outside Dia. of Pin	Dia. of Box Counterbore	Depth of Box Counterbore	Box & Pin Cone Base to Face	* Pin Cone Base Dia.	* Box Cone Base Dia.
	"mP"	"DP"	"KB"	"GZ"	"J"	"kP"	"kB"
⅝	1.128	.93695	0.955	.23	.156	0.943	0.943
		+.0000	+.010	+.00		+.000	+.008
		—.0128	—.000	—.03		—.008	—.000
¾	1.252	1.06195	1.080	.23	.156	1.068	1.068
		+.0000	+.010	+.00		+.000	+.008
		—.0128	—.000	—.03		—.008	—.000
⅞	1.378	1.18695	1.205	.23	.156	1.193	1.193
		+.0000	+.010	+.00		+.000	+.008
		—.0128	—.000	—.03		—.008	—.000

*Theoretical on product, actual on gauges.

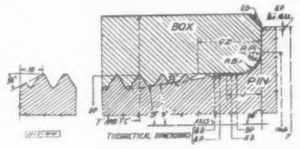


Figure 4.

SECTION 6

A.P.I. Sucker Rod Gauges: Registration

6-a. Any manufacturer desiring to produce sucker rod joints in accordance with these specifications shall provide himself with a set of reference master gauges, as specified herein, such reference master gauges to be checked and certified by the Bureau of Standards at Washington, D. C.; form of certificate to be as stipulated in Paragraph 8-b: "Testing of Reference Master Gauges."

6-b. He should supply himself with a set of supplementary production or working gauges, which may vary to suit individual working methods.

6-c. When a manufacturer is prepared and ready to order and use the A.P.I. standard rod gauges, he shall apply to the American Petroleum Institute for a certificate of authority to use the official A.P.I. monogram for each size gauge desired, as stipulated in the appendix, which certificate shall be his authority to purchase and use such gauges.

6-d. The American Petroleum Institute shall, upon receipt of an application for certificate, issue a certificate in duplicate for each size gauge, the duplicate to be sent with the order to the reference master gauge manufacturer, who is to be instructed that such will be his authority to furnish.

6-e. The original certificate shall be kept by the manufacturer to whom issued as his authority to use the official monogram of the American Petroleum Institute on sucker rod joints.

6-f. All sucker rod joint reference master gauges shall be kept consecutively numbered by the manufacturer, the number to be supplied on the certificate issued by the American Petroleum Institute.

6-g. The American Petroleum Institute shall keep a careful record of the certificate sizes and numbers of reference master gauges and to whom furnished.

6-h. The American Petroleum Institute shall furnish to each sucker rod joint manufacturer who has purchased and has in use the American Petroleum Institute reference master gauges, a record of all licensed users, showing sizes and numbers.

6-i. Should a manufacturer sell out or dispose of his business, carrying with it officially furnished reference master gauges for the sucker rod joints, the purchaser may have the certificates transferred upon request and the return of the old certificates to the American Petroleum Institute.

6-j. Should a reference master gauge for any sucker rod joint be destroyed or lost, the manufacturer should return the certificate with explanation to the American Petroleum Institute that their records may at all times be correct.

SECTION 7

A.P.I. Grand Master and Reference Master Gauges: Specifications

7-a. The American Petroleum Institute shall own a complete set of grand master gauges which are to be deposited with the United States Bureau of Standards at Washington, D. C., for the purpose of certifying manufacturer's reference master gauges, as stipulated in section 7.

7-b. Grand master gauges and manufacturer's reference master gauges shall consist of the following for each size joint:

(A) A master "go" plug gauge representing maximum thread and maximum cone of pin. (See Figure 6 and Table 6.)

(B) A mating reference ring for the master "go" plug. (See Figure 6 and Table 6.)

(C) A master "no go" plug gauge representing the minimum pitch diameter of the pin. (See Figure 7 and Table 7.)

(D) A mating reference ring for the master "no go" plug gauge. (See Figure 7 and Table 7.)

(E) A master "go" ring gauge representing the minimum thread and minimum cone of box. (See Figure 8 and Table 8.)

(F) A mating reference plug for the master "go" ring. (See Figure 8 and Table 8.)

(G) A master "no go" ring gauge representing the maximum pitch diameter of the box. (See Figure 9 and Table 9.)

(H) A mating reference plug for the master "no go" ring gauge. (See Figure 9 and Table 9.)

(I) "Go" and "no go" feeler gauges to check cone dimensions.

7-c. The purpose of these master gauges is to insure interchangeability of product between manufacturers within the limits prescribed herein.

7-d. It is the manufacturer's responsibility to insure that the product produced by him is within the limits stipulated in this specification. This adherence to specified dimensions may be accomplished by means of supplementary production of working gauges (which may vary to suit particular working conditions) or by any other adequate means.

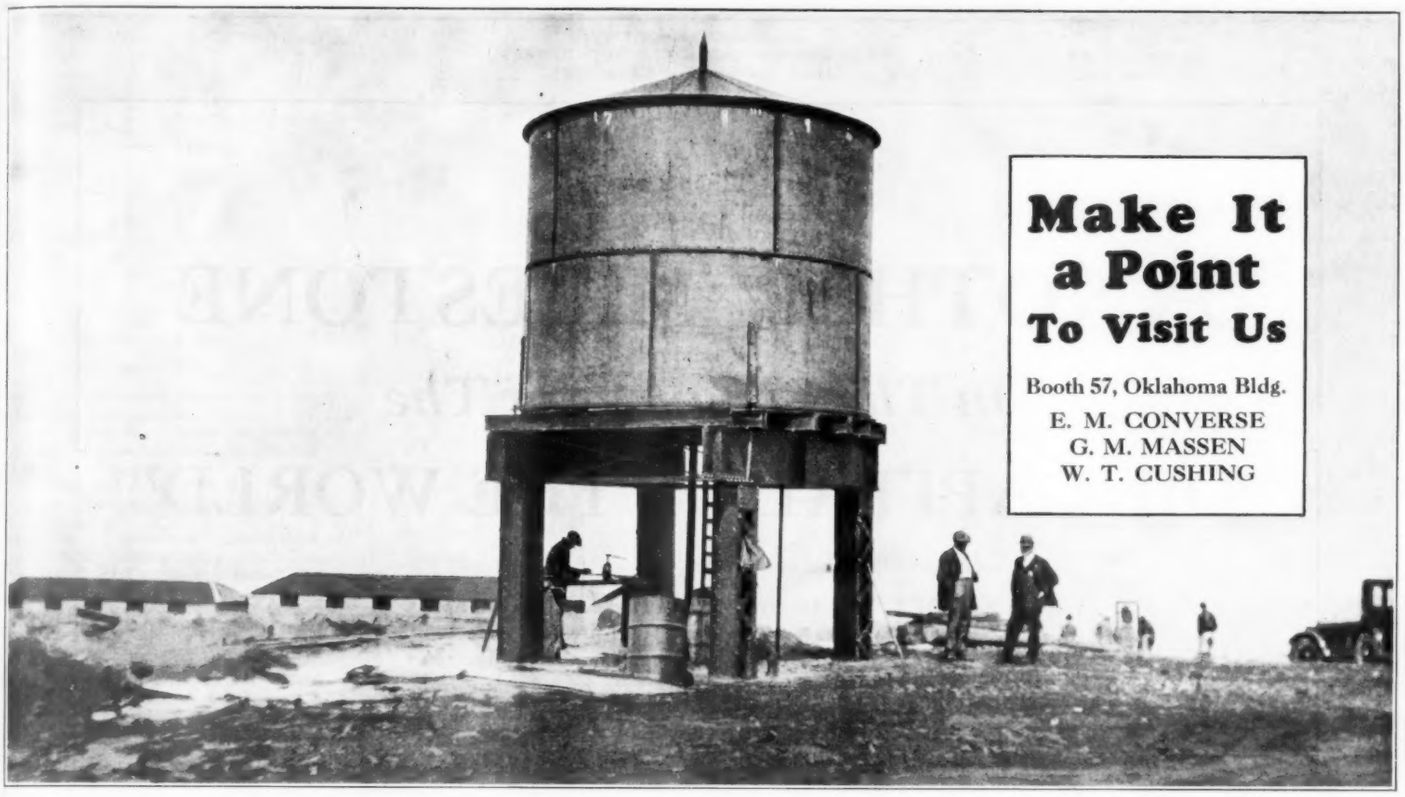
7-e. Maximum and minimum limits on thread and cone of the product can be checked by the methods described in Section 9.

7-f. A.P.I. grand master and manufacturer's reference master gauges shall be hardened and ground steel gauges and shall be manufactured in accordance with dimensions and tolerances given in tables and figures appended.

7-g. The form of threads for A.P.I. sucker rod gauges shall be the thread form specified herein for A.P.I. sucker rod threads.

7-h. Unless otherwise specified herein, A.P.I. sucker rod gauges shall conform to specifications of the National Screw Thread Commission for Class "X" gauges.

7-i. The mates of "go" master gauges shall assemble on their respective masters to cone contact by hand, without



A-Settin' on Top of the World

Up on top of that hill they call Pike's Peak, there's a water tank that just sets and sets. It laughs at old man weather and there isn't a pit or rust spot on it inside or outside.

Whether on this tank or buried in a swamp, NO-OX-ID is a-settin' on top of the world.

Hundreds of miles of pipe line in all kinds of soil are snug and secure from rust because of NO-OX-ID. Every inspection strengthens its case. Tanks, derricks, equipment in storage—every point where iron or steel might rust is safe under the chemical and mechanical protection of NO-OX-ID.

Service records made in the oil industry—available for investigation—show that NO-OX-ID has proven itself superior to any other material in rust prevention.

NO-OX-ID also stops corrosive action of any type on any line or equipment worth saving. Which will you have: NO-OX-ID or rust? Serviced by experienced Dearborn Service men.

DEARBORN CHEMICAL COMPANY

320 S. Michigan Ave., Chicago **299 Broadway, New York**

Canadian Headquarters: 2454-2464 Dundas St. West, Toronto

NO-OX-ID

IRON + OX = RUST

TRADE MARK

The Original Rust Preventive

ANOTHER MILESTONE

In The Progress of The

"OIL CAPITAL OF THE WORLD"

An Oklahoma Company Managed by Oklahomans.

THE 1927 International Petroleum Exposition, fully abreast of the times, will present perfected equipment and advanced methods in the production of petroleum and the manufacture of its many by-products on a scale that will far overshadow any previous event and will further exemplify the fact that Tulsa is truly the "Oil Capital of the World."

In educational programs, compelling general interest and varied entertainment features, it will present an epoch that truly marks a milestone in the progress of oil development. An event that will give ample returns for the time and expense incident with the visit. Come, it will be well worth your while.

It is with a goodly measure of gratification, in connection with the marking of this milestone in the progress of oil development, that this company points to the 12 months of its operation and its individual progress, during which time it has, through conservative business judgment and careful administration of the affairs of the company, acquired valuable holdings with a daily production upward of 1,000 barrels of oil, yielding an income in excess of 75 per cent of its outstanding stock. A signal distinction for a company dealing exclusively in royalties.

There are now 85 producing wells and 55 wells drilling on the properties of this company.

Officers and Directors:
W. E. BROWN
President
GEO. A. SIMON
Vice President
H. I. SHANKS
Sec'y-Treas.

ATLAS
Royalties Company

502 MID-CONTINENT BUILDING, TULSA

spinning, to a step value of .312 inch ± .0015 inch. (See Figure 5.)

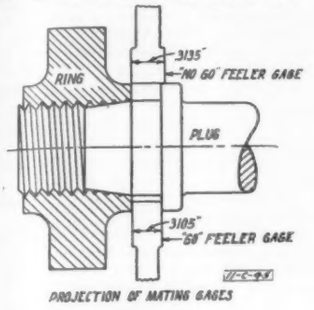


Figure 5.

7-j. "Go" reference masters shall assemble with corresponding mates A.P.I. "go" grand masters to cone contact by hand, without spinning, to a step value of .312 inch ± .003 inch.

7-k. The mates of "no go" master gauges shall be a good gauge fit on their respective masters.

7-l. "No go" reference masters shall assemble with corresponding mates of A.P.I. grand masters to full thread engagement by hand.

7-m. The ring gauges may be of the adjustable type, if properly locked and sealed.

7-n. The permissible eccentricity of cone of "go" gauges, with relation to axis of thread, shall not exceed .0002 inch.

7-o. The allowable variation in lead between any two threads no farther apart than the length of engagement, shall not exceed plus or minus .0002 inch.

7-p. The flanks of the thread may vary from the basic angle of 30 degrees to the normal by not more than plus or minus 10 minutes of arc.

7-q. A.P.I. gauges shall be stamped with the A.P.I. monogram, the nominal size of the rod, the words "go" or "no go," and the words "pin" or "box."

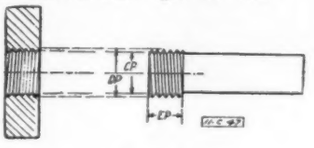


Figure 7.

TABLE 6
A.P.I. Sucker Rod Gauges
MASTER "GO" PLUG GAUGE AND MATING RING
(Minimum Pin Cone and Threads)
See Figure 6
All Dimensions in Inches at 68 Degrees Fahr.

Size of Rod	No. of Threads per Inch "B"	Major Dia. of Plug "DP"	Pitch Dia. of Plug "CP"	Minor Dia. of Mating Ring "dB"	Plug Cone Base Dia. "kP"	Thread Length "EP"	Plug Cylinder Diameter "KP"	Plug Collar Diameter "FP"	Length of Mating Ring "GX"
⅝	10	.93695	.87200	.82970	.94300	.63	.943	1.380	1.03
		+.0000	+.0000	+.0000	+.0000	±.01	+.000	+.000	±.01
		—.0004	—.0002	—.0004	—.0002		—.003	—.010	
¾	10	1.06195	.99700	.95470	1.06800	.88	1.068	1.505	1.28
		+.0000	+.0000	+.0000	+.0000	±.01	+.000	+.000	±.01
		—.0004	—.0002	—.0004	—.0002		—.003	—.010	
⅞	10	1.18695	1.12200	1.07970	1.19300	.88	1.193	1.692	1.28
		+.0000	+.0000	+.0000	+.0000	±.01	+.000	+.000	±.01
		—.0004	—.0002	—.0004	—.0002		—.003	—.010	

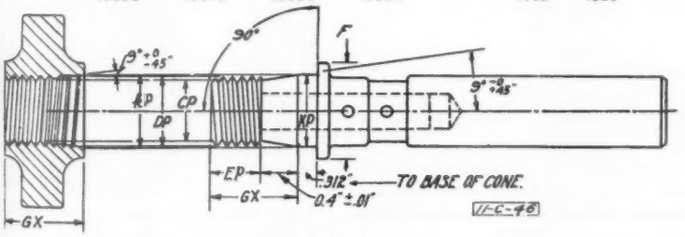


Figure 6.

TABLE 7
A.P.I. Sucker Rod Gauges
MASTER "NO GO" PLUG GAUGE AND MATING RING
(Minimum Pin Thread)
See Figure 7
All Dimensions in Inches at 68 Degrees Fahr.

Size of Rod	No. of Threads per Inch "B"	Major Diameter of Plug "DP"	Pitch Diameter of Plug "CP"	Minimum Minor Dia. of Mating Ring Gauge "dB"	Thread Length "EP"
⅝	10	.93695	.87000	.82970	Good
		+.0000	+.0002		
		—.0004	—.0000		
¾	10	1.06195	.99500	.95470	Commercial
		+.0000	+.0002		
		—.0004	—.0000		
⅞	10	1.18695	1.12000	1.07970	Practice
		+.0000	+.0002		
		—.0004	—.0000		

TABLE 8
A.P.I. Sucker Rod Gauges
MASTER "GO" RING AND MATING PLUG
(Minimum Box Thread and Cone)
See Figure 8
All Dimensions in Inches at 68 Degrees Fahr.

Size of Rod	No. of Threads per Inch "B"	Minor Diameter of Ring "dB"	Pitch Diameter of Ring "CB"	Major Diameter of Mating Plug "DP"	Ring Cone Base Diameter "kB"	Ring Length "GX"	Length of Threads on Mating Plug
⅝	10	.82970	.87300	.93695	.9430	1.03	.63
		+.0004	+.0002	+.0004	+.0002	±.01	±.01
		—.0000	—.0000	—.0000	—.0000		
¾	10	.95470	.99800	1.06195	1.0680	1.28	.88
		+.0004	+.0002	+.0004	+.0002	±.01	±.01
		—.0000	—.0000	—.0000	—.0000		
⅞	10	1.0797	1.12300	1.18695	1.1930	1.28	.88
		+.0004	+.0002	+.0004	+.0002	±.01	±.01
		—.0000	—.0000	—.0000	—.0000		

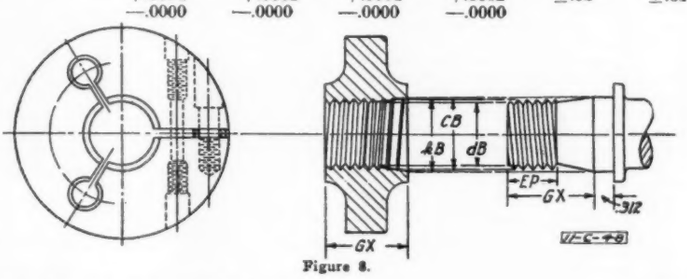


Figure 8.

Thread form.....
Cone diameter.....
Cone angle.....
Cone eccentricity.....
Remarks .....

(B) Test of reference master gauge No.....
For.....("no go" sucker rod joints.) (size) (box or pin).
Owned by.....
Assembly with A.P.I. grand master gauge No. .....
Reference ring on A.P.I. grand master plug.....
Reference plug in A.P.I. grand master ring.....
Test values of reference gauge:
Minor diameter, ring.....

	Plug	Ring
Pitch diameter.....		
Lead error		
Thread form.....		

Assembly .....
Remarks .....

TABLE 9
A.P.I. Sucker Rod Gauges
MASTER "NO GO" RING GAUGE AND MATING PLUG
(Maximum Box Threads)
See Figure 9
All Dimensions in Inches at 68 Degrees Fahr.

Size of Rod	No. of Threads per Inch "B"	Minor Diameter of Ring "dB"	Pitch Diameter of Ring "CP"	Major Diameter of Mating Plug "DP"	Ring Length "EB"	Length of Threads on Mating Plug "EB"
⅝	10	.82970	.87500	.93695	Good	Good
		+.0004	+.0000	+.0000		
		—.0000	—.0002	—.0004		
¾	10	.95470	1.00000	1.06195	Commercial	Commercial
		+.0004	+.0000	+.0000		
		—.0000	—.0002	—.0004		
⅞	10	1.0797	1.12500	1.18695	Practice	Practice
		+.0004	+.0000	+.0000		
		—.0000	—.0002	—.0004		

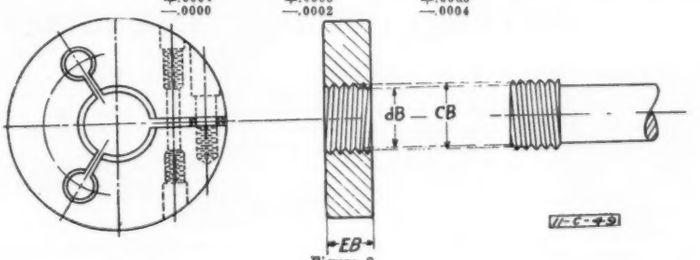


Figure 9.

SECTION 8

Certification of Reference Master Gauges

8-a. A producer of A.P.I. sucker rod joints shall have his reference master gauges tested by the United States Bureau of Standards, Washington, D. C., often enough to insure correct standards.

8-b. A certficate of test will be issued on each gauge tested, which certificate shall include the following information:

(A) Test of reference master gauge No.....
For.....("go" sucker rod joints.) (size) (box or pin).
Owned by.....
Step value.....
Step value, tested with A.P.I. grand master gauge No. .....
Reference ring on A.P.I. grand master plug.....
Reference plug in A.P.I. grand master ring.....
Test values of reference gauge:
Major diameter, plug.....
Minor diameter, ring.....

	Plug	Ring
Pitch diameter.....		
Lead error		

SECTION 9

Suggested Gauging Practice on the Use of Reference Master Gauges in Checking Interchangeability of Product

9-a. An inspector desiring to check the product for maximum and minimum limits may use the reference master gauges as indicated below.

9-b. This product inspection may be made in two steps:

(A) Checking the thread of the product.

(B) Checking the cone of the product.

Threads:

9-c. Threads: To check the maximum and minimum limits on the thread of the product the usual procedure in the use of "go" and "no go" gauges obtains, as follows:

9-d. To verify that the pin of product is not too small:

The pin of product shall not enter the mating ring (paragraph 7-b: C) of the reference master "no go" plug gauge. (See Figure 7.)

9-e. To verify that the pin of product is not too large:

The pin of product shall enter the mating ring (paragraph 7-b: B) of the reference master "go" plug gauge. (See Figures 6 and 10.)

9-f. To verify that the box of product is not too large:

The mating plug (paragraph 7-b: G) of the reference master "no go" ring gauge shall not enter the box of product. (See Figure 9.)

9-g. To verify that the box of product is not too small:

The mating plug (paragraph 7-b: F) of the reference master "go" ring gauge shall enter the box of product. (See Figures 8 and 11.)

9-h. Cones: To check the size of the cones, the use of "go" and "no go" feeler gauges is necessary, in conjunction with the reference master "go" (only) plug and ring gauges. These feeler gauges should not be confused with the interchange feeler gauges previously specified.

9-i. The pin of the product shall screw into the mating ring (paragraph 7-b: B) of the reference master "go" plug gauge (see Figure 6) to cone contact, by hand, without spinning, to the following step values, which may be determined with feeler gauges as shown. (See Figure 10.):

Maximum=.1560 inch—"no go" feeler.
Maximum=.1307 inch—"go" feeler.

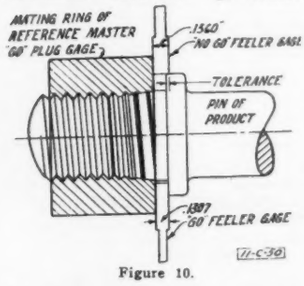


Figure 10.

9-j. The mating plug (paragraph 7-b: F) of the reference master "go" ring gauge (see Figure 8) shall screw into the box of the product to cone contact by hand, without spinning, to the following step values, which may be determined by feeler gauges, as shown. (See Figure 11.)

Maximum=.1560 inch—"no go" feeler.
Minimum=.1307 inch—"go" feeler.

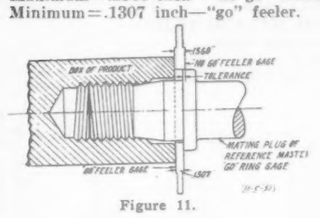


Figure 11.

SECTION 10
Inspection and Rejection

9-a. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacture of the material hereunder. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

9-b. Where inspector representing the purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

9-c. Material manufactured in accordance with these specifications which proves to be defective subsequent to acceptance at manufacturer's works or when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A.P.I. material. When material stamped or marked with the A.P.I. monogram is rejected, such monogram shall be cancelled as follows:

9-d. A steel cancelling stencil, one-half inch square, shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

Section 4—Flywheel and Clutch Connections

4-a. Clutches, reverse gear connections and flywheel connections manufactured in accordance with the dimensions given in Table 1 and Figure 1, are standard.

4-b. Both members of standard A.P.I. 12-inch or 16-inch flanges shall be plainly marked on the rim with the A.P.I. monogram and with the designation 12-inch or 16-inch.

Section 5—Foundation Bolt Sizes

5-a. A.P.I. standard foundation bolts shall be as specified in Table 2 and Figure 2.

5-b. All manufacturers of engines shall provide suitable bolt holes in bed plates to accommodate the standard bolts specified herein.

[With this method of rating, an engi of this type would, for example, be rate as 40-65 horsepower (40 horsepower at re ommended speed for pumping service, an 65 horsepower tested maximum.)]

6-b-2. On the cross-section chart the A.P.I. standard rating test form sha be noted the following points, as ind cated in Figure 4.

(A) The recommended operating spe for pumping service.

(B) The tested speed of maximu power.

(C) The recommended maximum saf operating speed.

(D) The tested minimum speed which the governor will function.

6-b-3. No engine shall be sold unde the A.P.I. standard rating test form u less the manufacturer will guarantee th

TABLE 1—A.P.I. STANDARD DIMENSIONS FOR REVERSIBLE CLUTCH AND ENGIN FLY WHEEL FLANGE CONNECTIONS
See Figure 1

Class of Engines Adapted to—A.P.I. Rating at Normal Pumping Speed*	Clutch: Designation of Clutch Flange	Clutch: Diameter of Flange A	Reverse Gear Connections: Diameter of Female Recess B	Reverse Gear Connections: Depth of Female Recess C	Flywheel Connections: Diameter of Flange D	Flywheel Connections: External Diam. of Male Projection E	Flywheel Connections: Length of Male Projection F	Diameter of Bolt Circle G	Size of Bolt Hole H	Size of Bolt I	No. of Bolts
35 hp. and under	A.P.I. 12"	12"	6.003"	1/4"	12"	6.000"	3/16"	10-1/4"	57/64"	7/8"	6
Above 35 hp.	A.P.I. 16"	16"	7.254"	9/32"	16"	7.250"	7/32"	13-1/4"	1-1/64"	1"	6

Note: An adapter or sub can be made to fit new A.P.I. flanges to old-style clutc flanges. *Rating "A" of Section 6—(6-b.)

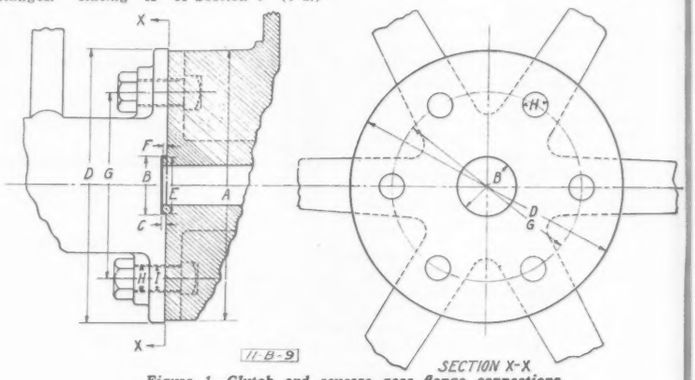


Figure 1—Clutch and reverse gear flange connections.

Figure 2
Table 2—Foundation Bolt Sizes
See Figure 2.

Bolt Symbols	Engine hp. at Normal Pumping Speeds 25 hp.	30 hp.	35 hp.	40 hp.
A D	1"	1"	1¼"	1¼"
A E	⅞"	⅞"	⅞"	⅞"
A F	⅞"	⅞"	⅞"	⅞"

Note: All horsepower ratings are at recommended normal pumping speeds as given for "A" Section 6—(6-b.)

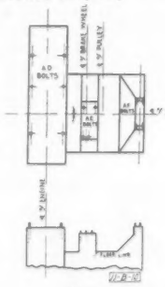


Figure 2.

Section 6—Internal Combustion Engine Rating

6-a. The manufacturer shall furnish the purchaser, upon request, with the A.P.I. rating of the engine upon a chart as indicated in sample rating curve, Figure 4, and as indicated in test form, the combined chart and test form being the "A.P.I. standard rating test form for internal combustion engines for oil field service."

6-b. Rating.

6-b-1. The A.P.I. horsepower rating of horizontal single-cylinder gas, gasoline, or oil engines for oil field service shall be a double rating which expresses the average maximum brake horsepower as developed by the engine at

(A) The recommended operating speed for pumping service, and

(B) The tested speed of maximum power.

"recommended maximum safe operati speed (C)" to be at least 110 per ce of the "tested speed of maximum po er (B)".

Standard Rating Test Form for Single Cyli der, Horizontal Type, Internal Combustion Engines for Oil Field Service.

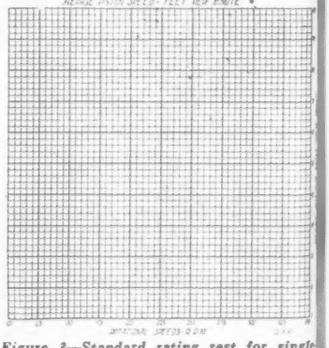


Figure 3—Standard rating test for single cylinder horizontal type internal combustion engines for oil field service.

RATING | B.hp.

(A) Normal | (B) Maximum

Manufacturers Name ...Date of test...19
Engine No. .....; 2 or 4 cycle .....
Cylinder bore, in. .....; Stroke; In. .....
Type Fuel used .....; Type of Ignitor ...
Type of governor ...; Type of lubricator ...

Test Data

Type of brake used ..; Brake arm, ft...in.
Fuel used in test ..; °A.P.I. or Sp. Gr. ...
BTU/lb. or BTU/cu. ft. .....
Average Temperatures:
Air .....°F.; Water .....°F
Fuel .....°F.; Crank case oil .....°F
Fuel pressure at intake valve, lb./sq. in.
Altitude of shop where test was made.
above sea level .....
Observer .....

°Note: The scale for piston speed is t be calculated and entered at the top of t graph:

Average piston speed in feet per minu =(Rotational Speed) (2); stroke in inche

12

R. P. M. (85%) .....

A.P.I. SPECIFICATIONS FOR INTERNAL COMBUSTION ENGINES

Particular attention is directed to Section 3 on "marking." It will be noted that authority to use the A.P.I. monogram has been limited to the flange connections only, for which definite specifications have been adopted. This is in keeping with the policy of the institute to authorize the use of its monogram only on products for which definite specifications on dimensions, or quality of material, or both, have been adopted.

The adopted method of rating single cylinder horizontal internal combustion engines contained herein is intended to afford the purchaser a means of comparing engines of different manufacturers, and provides a uniform basis for the comparison but does not necessarily indicate that an engine so rated is the one best suited for, or guaranteed to fulfill, the requirements of the purchaser. Authority to use the A.P.I. monogram, therefore, cannot be granted in connection with the rating of internal combustion engines for fear of creating a misunderstanding of its generally accepted purpose in the mind of the average user.

Section 1—Material Covered

1-a. These specifications apply to internal combustion engines for oil field service, and include specifications for clutch and flywheel connections, foundation bolt sizes, and methods of rating horsepower.

1-b. These standards apply to new equipment, and do not include either chemical or physical properties of materials, except as applying to finish.

Section 2—Workmanship and Finish

2-a. All machined or mating surfaces shall be finished in a good and workmanlike manner and shall be free from burrs, rough edges, etc.

2-b. All castings shall have rough edges chipped or ground off, shall be commercially clean and shall be free from injurious defects. All cored bolt holes shall be drifted to insure free passage of proper-sized bolts.

2-c. All forgings shall be free from injurious defects and shall have a workmanlike finish.

Section 3—Marking

Clutch and reverse gear flange connections:

3-a. Clutch and reverse gear flange connections manufactured in accordance with the dimensional standards contained herein shall be stamped or marked with the A.P.I. monogram as stipulated in paragraph 4-b. Authority to use the A.P.I. monogram will be granted in accordance with the rules and conditions contained in the appendix.

3-b. Clutch and reverse gear flange connections shall also be marked with the manufacturer's name or identifying mark.

3-c. Where the A.P.I. monogram is specified on forged material, it shall be applied with a steel stencil; size of monogram to be one-half inch high.

3-d. When the A.P.I. monogram is specified on cast material, the design of the monogram shall be affixed to the pattern; letters to be 1½ inches long in a 2-inch circle. Height of letters and circle to be not less than one-eighth inch.

3-e. Any single cylinder horizontal type, internal combustion engine rated in accordance with these specifications may be stamped on the name plate with its A.P.I. horsepower rating. For example, an engine rating 40-65 horsepower for the two standard conditions specified herein may be stamped on the name plate as follows:

"40-65 hp. A.P.I."

The Oil Bank of America

Out of the development of every basic industry rises one financial institution particularly identified with that industry. - - - - In petroleum it is The Exchange Banks of Tulsa. Leadership earned by a superior service based on intimate knowledge.

The personal and practical experience of the directors of The Exchange National Bank and the Exchange Trust Company in every branch of the oil business, combined with a vast system of credit information is available to customers of The Exchange Banks.

Plan to Meet Your Friends in Our Lobby
During The International Petroleum Exposition.

EXCHANGE BANKS OF TULSA

The Exchange National Bank — The Exchange Trust Company

Combined Capital, Surplus and Profits, $4,850,000.
Resources Exceed $50,000,000.

Away Ahead of Former Years

The International Petroleum Exposition

means additional economies and more efficient methods in the Oil Industry.

You are cordially invited to visit the Skelly Booth in the Oklahoma Building also—

—the new improved Class IV tank car with patented dome cover developed by Skelly experts, on exhibition alongside the Oklahoma Building.

SKELLY

SKELLY OIL COMPANY

TULSA AND EL DORADO

Branch Offices: Kansas City, Omaha, Minneapolis

PRODUCERS, REFINERS AND MARKETERS OF QUALITY PRODUCTS.

Three Minute Average Maximum Brake Horsepower Tests

Rotational Speed	Brake Reading	Computed B.hp.	Angle of Spark
R. P. M. (35%)	.....	.....	.....
R. P. M. (50%)	.....	.....	.....
R. P. M. (75%)	.....	.....	.....
R. P. M. (100%)	.....	.....	.....
R. P. M. (110%)	.....	.....	.....

ONE HOUR FUEL CONSUMPTION TESTS

Rotational Speed	Av. B.hp.	Fuel Rate per 24 hrs.	BTU per B.hp. hour
A—Rec. Normal Speed	(100%)	.....lb. or cu. ft.	.....
A—Rec. Normal Speed	(50%)	.....lb. or cu. ft.	.....
B—Speed of Max. Power**	(100%)	.....lb. or cu. ft.	.....
B—Speed of Max. Power	(50%)	.....lb. or cu. ft.	.....

**100% represents the rotational speed at which maximum power is delivered (Ordinate "B" of Figure 4).

Sample A.P.I. rating test forms—8½ inches by 11 inches—can be secured from the A.P.I. division of standardization, 1508 Kirby Bldg., Dallas, Texas.

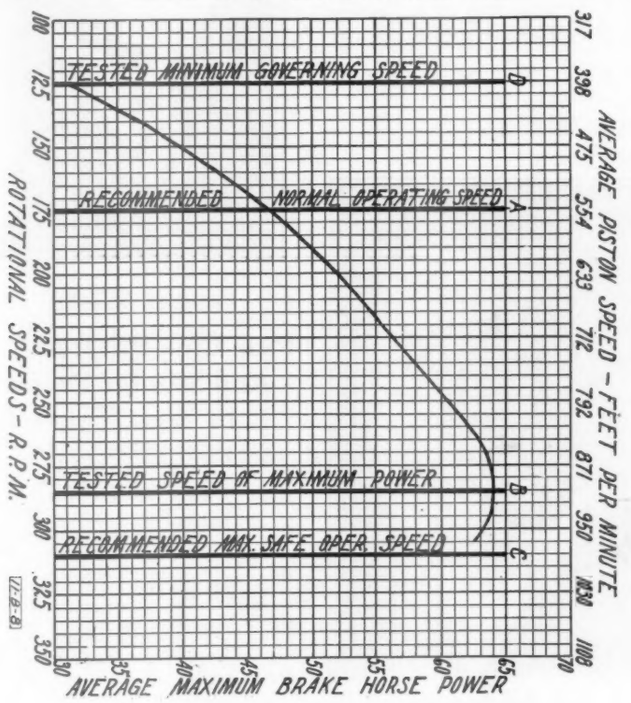

TESTED MINIMUM GOVERNING SPEED
RECOMMENDED NORMAL OPERATING SPEED
TESTED SPEED OF MAXIMUM POWER
RECOMMENDED MAX. SAFE OPER. SPEED
ROTATIONAL SPEEDS - R.P.M.
AVERAGE PISTON SPEED - FEET PER MINUTE
AVERAGE MAXIMUM BRAKE HORSE POWER

Figure 4—Sample rating test chart.

For 46/64 B.hp. Engine, 19-inch Stroke.
This sample rating chart is for purpose of illustration only.

6-c. Test data required.

6-c-1. Manufacturers offering such engines for oil field service shall furnish an A.P.I. standard rating test form, which shall comprise a horsepower performance curve (on the cross-section chart) and a record of fuel consumption, reporting on separate sheets the characteristics of each model and size of engine. If such a curve and record are furnished to represent the average performance of a group of engines, the manufacturer shall guarantee that under operating conditions similar to those of the test, the performance of each individual engine sold of the group shall at least equal the power rating and not exceed it by more than 5 per cent.

6-c-2. The A.P.I. horsepower performance curve shall show the average maximum brake horsepowers as of manufacturers' shop conditions. Considering the r.p.m. at point (B), during which maximum brake horsepower is delivered, as 100 per cent, the curve shall be a smooth line drawn through a minimum of five points of speed spaced approximately as follows:

35%—50%—75%—100%—110%

6-c-3. The A.P.I. fuel consumptions shall be expressed in B.t.u. per brake-horsepower hour." If the fuel used is gas, the consumption shall also be expressed as the "cubic feet of gas, of given B.t.u. value per cubic foot, consumed in 24 hours"; or, if the fuel used is liquid, the consumption shall also be expressed as the "pounds of liquid fuel, of given B.t.u. value per pound, consumed in 24 hours." The A.P.I. fuel consumption shall be determined for 50 and 100 per cent of the full brake- horsepower loads developed at

(A) The recommended operating speed for pumping service, and

(B) The tested speed of maximum power.

6-d. Test procedure.

6-d-1. The engine shall be given a preliminary run of not less than two hours to determine optimum adjustment and to effect uniform operating temperatures and conditions. These shall be maintained as nearly constant as possible throughout the subsequent test.

6-d-2. Speed fluctuation shall not exceed five revolutions per minute during each single brake-horsepower test point determination, and during each of the maximum brake-horsepower fuel consumption determinations. For the 50 per cent brake-horsepower fuel consumption determinations, the engine may be operated on its governor and the average speed shall not vary more than five revolutions per minute from the nominal test point values of

(A) The recommended operating speed for pumping service, and

(B) The speed of maximum power.

6-d-3. The minimum duration of brake-horsepower tests shall be three minutes for each of the five test points.

6-d-4. The minimum duration of fuel consumption tests shall be 30 minutes for each of the four combinations of speed and load.

6-d-5. During the test, data shall be recorded and calculated as shown on the accompanying A.P.I. standard rating test form.

Note: It is recommended that all A.P.I. brake-horsepower and fuel consumption tests be made with either a hydraulic or an electric dynamometer to insure uniform rotational speeds over extended periods. Speed control with a simple friction prony brake usually is unsatisfactory for slow speed tests.

Section 7—Inspection and Rejection

7-a. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which will concern the manufacturer of the material ordered hereunder. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

7-b. Where inspector representing the purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

7-c. Material manufactured in accordance with these specifications which proves to be defective subsequent to acceptance at manufacturer's works or when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped with the A.P.I. monogram or sold as A. P.I. material. When material stamped or marked with the A.P.I. monogram is rejected, such monogram shall be canceled as follows:

7-d. On cast material the loop in the letter "P" shall be chipped off.

7-e. On forged material, a steel canceling stencil, one-half inch square as shown shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

INSTITUTE SPECIFICATIONS FOR MISCELLANEOUS PUMPING EQUIPMENT

SECTION 1

Material Covered

These specifications apply to working barrel pump parts, polished rods and standard sizes for pressure gauge taps and fittings at well heads. They are dimensional only and apply to new material.

SECTION 2

Marking

No action taken by the committee as yet on the marking of the material covered by this specification.

SECTION 3

Pump Parts

A compromise was reached which permitted a final agreement on a single set of standard dimensions for pump parts. Eastern practice was adopted for 2-inch pump parts and western practice for the large sizes, since the bulk of the eastern manufacturers' output is in the 2-inch size, with the reverse being true of the western manufacturers.

Pump parts, manufactured in accordance with the illustrations given in Fig-

(Continued on Page 305)

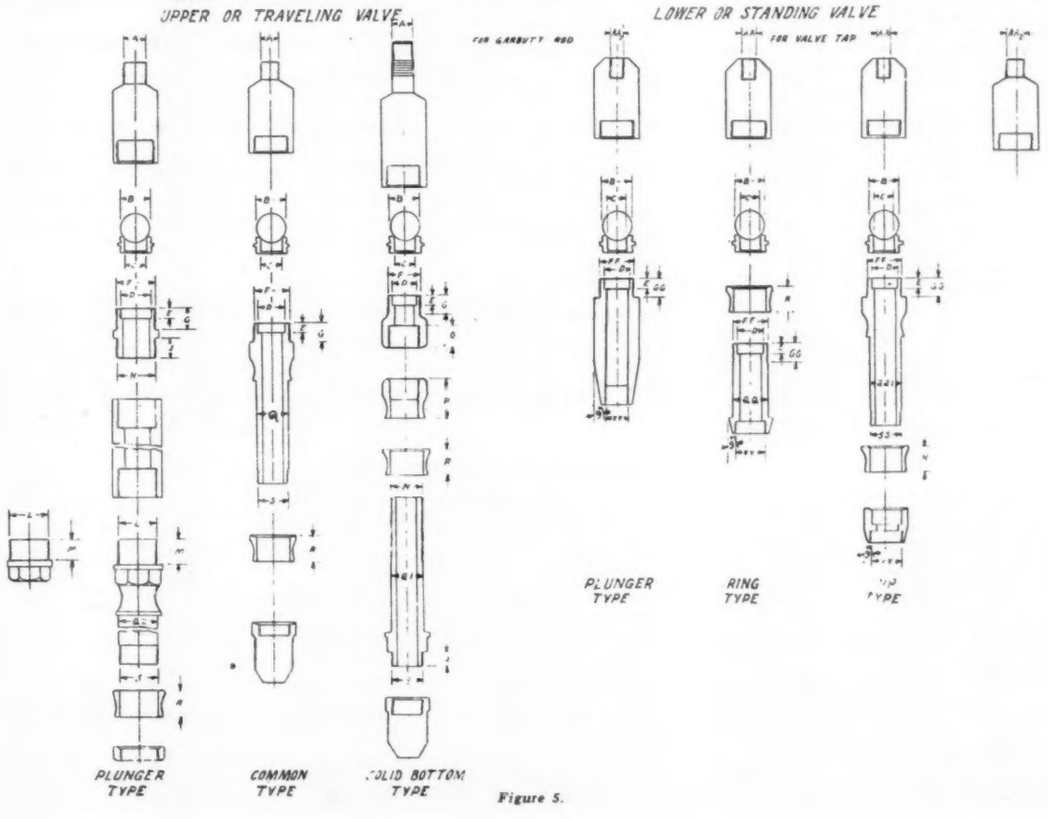


Figure 5.

ures 1 and 2, and dimensions given in Tables 1, 2 and 3, are standard.

SECTION V
Well Head Taps and Fittings
(Recommended Field Practice)

Standard Sizes for Pressure Gauge Taps and Fittings at Well Heads

It is well known that different pressure gauge manufacturers follow different practice with regard to the size and kind of connections furnished on pressure gauges. It frequently happens that gauges are delivered for use at wells with one-fourth inch, three-eighths inch, or one-half inch connections, and the connections may be male, female, or even unions. As pressure gauges are usually needed at times of stress when flowing or gas lift wells are being worked upon, and as necessary bushings are seldom available at the wells for making connections, the committee formulated the following recommendations to oil producers to eliminate all confusion and delay:

1. All taps and pressure gauge connections at well heads, including taps and connections for bleeders, are to be one-half inch standard pipe size.

2. All pressure gauges are to be fitted with bushings to give one-half inch male pipe connections before being delivered by store house to the field.

3. All gauges are to be fitted with valve or stopcock immediately under gauge before being delivered by storehouse to the field.

Compliance with these recommendations will eliminate all confusion in regard to the fitting of pressure gauges and will not interfere with gauge manufacturers' designs.

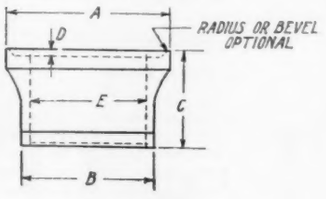


Figure 2.

TABLE 3—CUT RING DIMENSIONS

	2" Pumps	2 1/2" Pumps	3" Pumps	4" Pumps
A	Optional	Optional	Optional	Optional
B	1 13/32"	1 27/32"	2 11/32"	3 1/4"
C	1"	1 3/16"	1 1/4"	1 1/2"
D	Optional	Optional	Optional	Optional
E	1.192"+.006" −.000"	1.567"+.006" −.000"	2.005"+.006" −.000"	2.820"+.006" −.000"

SECTION 4—POLISHED RODS

Two sizes (diameters) of polished rods are standard. Polished rods made in accordance with dimensions given in Table 4 are standard.

TABLE 4

O. D. of Polished Rod Inches	Threads* Pins and Boxes Std. A.P.I. Sucker Rod for A.P.I. Sizes	Permissible Lengths Feet	Remarks
1⅛	⅝" A.P.I. Standard	10, 11 & 20	For use with ⅝" A.P.I. Sucker Rods
1⅜	¾" A.P.I. Standard	10, 11 & 20	For use with ¾" A.P.I. Sucker Rods
1¼	⅞" A.P.I. Standard	10, 11 & 20	For use with ⅞" A.P.I. Sucker Rods
1¾	⅞" A.P.I. Standard	10, 11 & 20	For use with ⅞" A.P.I. Sucker Rods

Polished rods may be of double pin or box and pin type.

*Special Note: Where A.P.I. standard sucker rod joints are specified, they shall be manufactured and gauged in accordance with the latest edition of A.P.I. Standards, No. 11-B, "Sucker Rod Specifications."

FRANK REDICK
Pumping Equipment and Engines.

L. P. BURGESS
Pumping Equipment.

TABLE 1—UPPER OR TRAVELING VALVE

Dimension	2" Pump	2½" Pump	3" Pump	4" Pump
A—Thread detail	13/16" pin as on ⅝" A.P.I. Sucker Rod	1 1/16" pin as on ¾" A.P.I. Sucker Rod	1 1/16" pin as on ¾" A.P.I. Sucker Rod	1 3/16" pin as on ⅞" A.P.I. Sucker Rod
B—Diameter of ball	1⅛"	1⅜"	1¾"	2½"
C—Diameter seat opening	Optional	Optional	Optional	Optional
D—Diameter seat recess	1.187"+.000"-.002"	1.437"+.000"-.002"	1.750"+.000"-.002"	2.625"+.000"—.002"
E—Length recess	⅜"	⅜"	⅜"	7/16"
F—P. dia. and pitch	1.422"–14 thd. U.S.F. ±.002"	1.754"–14 thd. U.S.F. ±.002"	2.050"–11½ thd. U.S.F. ±.003#	3.112"–11½ thd. U.S.F. ±.003#
G—Length threads	13/16"	7/8"	1 1/16"	1⅛"
H—P. dia. and pitch	1.460"–14 thd. U.S.F. ±.002"	1.938"–14 thd. U.S.F. ±.002"	2.316"–11½ thd. U.S.F. ±.003#	3.323"–11½ thd. U.S.F. ±.003#
J—Length threads	⅞"	13/16"	1"	1¼"
L—P. dia. and pitch	1.460"–14 thd. U.S.F. ±.002"	1.938"–14 thd. U.S.F. ±.002"	2.316"–11½ thd. U.S.F. ±.003#	3.323"–11½ thd. U.S.F. ±.003#
M—Length threads	⅞"	13/16"	1"	1¼"
N—P. dia and pitch	1.141"–14 thd. U.S.F. ±.002"	1.512"–14 thd. U.S.F. ±.002"	1.944"–11½ thd. U.S.F. ±.003#	2.750"–11½ thd. U.S.F. ±.003#
O—Length threads	1⅛"	1⅛"	1⅛"	1¼"
P—Length	1 13/16"	1 13/16"	2⅜"	3"
Q—Diameter	1.187"+.000" −.010"	1.662"+.000" −.010"	2.000"+.000" −.010"	2.812"+.000" −.010"
Q-1—Diameter	1.187"+.000" −.010"	1.562"+.000" −.010"	2.000"+.000" −.010"	2.812"+.000" −.010"
Q-2—Diameter	1.187"+.000" −.010"	1.562"+.000" −.010"	2.000"+.000" −.010"	2.812"+.000" −.010"
R—Length cup ring	1"	1 3/16"	1¼" 1½"	
S—P. dia. and pitch	1.141"–14 thd. U.S.F. ±.002"	1.512"–14 thd. U.S.F. ±.002"	1.944"–11½ thd. U.S.F. ±.003#	2.750"–11½ thd. U.S.F. ±.003#
T—Length threads	¾"	¾"	7/8"	

TABLE 2—LOWER OR STANDING VALVE

Dimension—	2" Pump	2½" Pump	3" Pump	4" Pump
AA—Nominal dia.	¾"–10 thd. U.S.S.	¾"–10 thd. U.S.S.	¾"–10 thd. U.S.S.	¾"–10 thd. U.S.S.
AA-1—Nominal dia.	¾"–10 thd. U.S.S.	¾"–10 thd. U.S.S.	¾"–10 thd. U.S.S.	¾"–10 thd. U.S.F.
AA-2—Thread detail	.....	.....	.....	1¼" pipe
B—Dia. ball	1¼"	1¾"	1¾"	2½"
C—Dia. seat opening	1⅜"	Optional	Optional	Optional
D—Dia. seat recess	1.187"+.000" −.002"	1.437"+.000" −.002"	1.750"+.000" −.002"	2.625"+.000" −.002"
E—Length seat recess	⅜"	⅜"	⅜"	7/16"
FF—P. dia. and pitch	1.422"–14 thd. U.S.F. ±.002"	1.754"–14 thd. U.S.F. ±.002"	2.050"–11½ thd. U.S.F. ±.003#	3.112"–11½ thd. U.S.F. ±.003#
GG—Length threads	13/16"	⅞"	1 1/16"	1⅛"
QQ—Dia.	1.468"+.000" −.010"	1.875"+.000" −.010"	2.312"+.000" −.010"	3.312"+.000" −.010"
QQ-1—Dia.	1.187"+.000" −.010"	1.562"+.000" −.010"	2.000"+.000" −.010"	2.812"+.000" −.010"
R—Length cup ring	1"	1 3/16"	1¼"	1½"
SS—Dia. and pitch	1.141"–14 thd. U.S.F. ±.002"	1.512"–14 thd. U.S.F. ±.002"	1.944"–11½ thd. U.S.F. ±.003#	2.750"–11½ thd. U.S.F. ±.003#
VV—Thread detail	¾" pipe	1" pipe	1½" pipe	2" pipe

D. R. DALE
Pumping Equipment.

Pipe Line Progress And Storage Projects In West Texas Area

HOUSTON, Tex., Sept. 17. — Rapid construction time is being made by the Magnolia Pipe Line Co. in the building of an 8-inch line from the University Pool in Crane County to the Magnolia company's tank farm site at Midland. All of the pipe for the line has been strung and the ditching is expected to be started during the current week. Contracts have been let for the grades for 10 tanks at the Midland tank farm site. The line will have a capacity of 25,000 bbls. daily, it is estimated. Oil is expected to be running through the line by October 1.

Magnolia Petroleum is also making a survey for an 8-inch welded pipe line from its West Texas tank farm at Midland to Riddle Station, Comanche County, to connect with Magnolia's main line system to Gulf.

Probable entrance of another crude purchaser in the promising looking Winkler Field in Winkler County is seen in the report of the Ozark Pipe Line Co., making a survey for a short line into that area. The survey is being made to a point near Pyote on the Texas & Pacific Railroad. Humble is running a line into that area to connect with its West Texas trunk system. American Petroleum Co. has almost completed a line from Pyote to the Winkler area.

The Ozark company recently completed a survey for a line from a point on the Orient Railroad near McCamey to the Yates Pool in Pecos. However, it is reported that company will not build a line into Pecos until the company has developed its acreage in Pecos.

Little new tank building was reported from the West Texas areas during the past week. Landreth Production Co. has twelve 55,000-bbl. capacity tanks completed on the Landreth strip in Crane County. Eleven of those tanks were full on September 5. Nine have been ordered for immediate construction and contracts have been let for the construction of nine more to be built in the near future. As planned at present the Landreth corporation will have thirty-two 55,000-bbl. tanks on the strip when the tank building program is completed.

Humble Pipe Line Co. has completed the grades for two 65,000-bbl. capacity tanks on its farm in Winkler County. In the Panhandle the Canyon Oil Co. is building a new 55,000-bbl. tank on its lease in Section 13, Block Y, Hutchinson County. The Canyon company has five wells on its lease in that section and plans to store the production of the lease until a better market for Panhandle crude is available.

"Sully," the Chemist, Says — Why Swap performance for promise?

See Our
Exhibit Booth No. 48
OKLAHOMA BLDG.
INTERNATIONAL PETROLEUM EXPOSITION
and say howd'y to us.

Perhaps new Cement Accelerators are as good as their sponsors claim, but KONSET long ago passed the experimental stage.

NO SENTIMENT in drilling operations. Either a product is or it ain't! With thousands of dollars at stake, who wants to pioneer for a newcomer? Proven results, alone, count. At the least, it's risky to swap known performance for promise in choosing an Accelerator for setting and waterproofing the cement. It's even worse to pay more.

Konset

Combines 5 reactions in the one operation

ORIGINALLY devised from practical experience in the Oil Fields, Konset is compounded to meet the peculiar conditions in the Fields. Long ago it passed the experimental stage. Thousands of wells the world over have been put into production at least 12 days earlier with this marvelous quick-setting, acid and water repelling compound. It's the only Quick-Hardener, so far as is known, officially Okeyed by the Petroleum Departments of 3 Governments. Why swap proven performance for promise?

Quickens the use, strengthens and lengthens the life of cement for engine foundations, and anywhere around the lease.

SULCO
LIFE PRESERVERS FOR THE OIL FIELDS
PRODUCTS
COPYRIGHT—1927—THE SULLIVAN CO.

For Sale by Any Supply Store or Lumber Yard

The SULLIVAN *Company*

Memphis, U. S. A. **Montreal, Can.**

Offices at

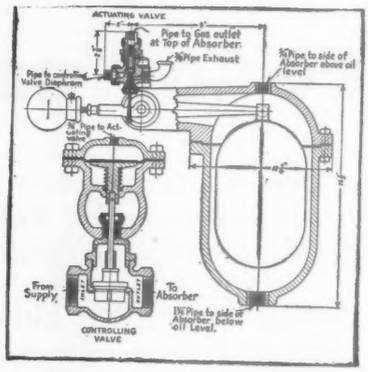
Tulsa
Houston
Los Angeles
Shreveport
Casper, Wyo.

Export: Oilfield Equipment Co., New York

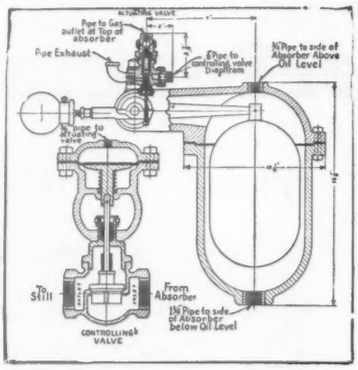
Other Sulco "Life Preservers for the Oil Fields" include KLEEN-A-WELL for cleaning tubing and rods, SLUSHMIX, the improved mud-laden fluid, SULCO LIQUID PACKING, and preservatives for buildings and equipment.

SALES and SERVICE

WESTCOTT & GREIS INC. W&G MEASUREMENT & CONTROL


ACTUATING VALVE
Pipe to Gas outlet at Top of Absorber.
¾ Pipe Exhaust
¾ Pipe to side of Absorber above oil level
Pipe to controlling Valve Diaphragm
¼ Pipe to Actuating valve
From Supply
To Absorber
CONTROLLING VALVE
1½ Pipe to side of Absorber below oil Level.

CONTROLLING INLET FLOW


ACTUATING VALVE
Pipe to Gas outlet at Top of absorber
Pipe Exhaust
¾ Pipe to controlling valve Diaphragm
¾ Pipe to side of Absorber Above Oil Level
¼ Pipe to Actuating valve
To Still
From Absorber
CONTROLLING VALVE
1½ Pipe to side of Absorber below Oil Level

CONTROLLING OUTLET FLOW

VIGILANT OIL LEVEL REGULATORS

For remote control of the oil supply in Absorber Tanks—

In the process of the manufacture of gasoline by absorbing the gasoline in oil and subsequently separating the gasoline from the oil by distillation, it is necessary to maintain a constant oil level in both the absorbing tank and the still.

All of the new features embodied in the Vigilant Feed Water Regulator, which we invented and placed on the market thirty years ago, are to be found in the Vigilant Oil Level Regulator.

The Vigilant Oil Level Regulator is usually constructed to control the outlet flow of oil from an absorber. When so constructed the controlling valve is placed in the oil discharge line from the absorber. By placing the actuating valve on the opposite side of the fulcrum the regulator will control the inlet flow of oil to the absorber and the controlling valve is placed in the inlet oil line to the absorber.

THE CHAPLIN-FULTON MANUFACTURING COMPANY

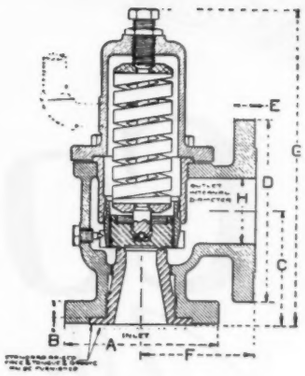
Pittsburgh, Penn.

Westcott & Greis, Inc.

MEASUREMENT AND CONTROL

SALES and WESTCOTT & GREIS INC. W&G MEASUREMENT & CONTROL SERVICE

CROSBY
Relief Valve
Style JJ



This is a valve for extreme service for use under high pressures and temperatures and where very high capacity is required.

This valve has a nozzle throat tube and the guides are above the disc. This design not only insures the maximum obtainable discharge capacity (approximately 98% of the theoretical discharge of the orifice), but the "sticking" of the disc, due to the guides adhering to the seat from sediment, deposits (such as coking) or difference in expansion, is avoided.

The valve is mounted with a special hard alloy steel, unequalled for its resistance to erosion, corrosion and high temperature.

Extensively used on oil lines, hot and cold, and on pressure stills and cracking coils.

Send for special catalogues and prices. Please state service required.

Crosby Compound Pressure and Vacuum Gage

The Crosby Compound Pressure and Vacuum Gage, style AAX, is a precisely machined, carefully made instrument. Carefully calibrated, in dial sizes from 3½ to 12 inches, with non-luminous dial, wide graduations plainly marked, and easily read.

In quantities of 25 or more, company name is supplied on dial, free. The Crosby Company manufactures a complete line of test, altitude and hydraulic gauges for pressures to 15,000 pounds, regular, and above, on special order. Write for completely descriptive catalog.

CROSBY STEAM GAGE & VALVE COMPANY, Boston, Mass.

Westcott & Greis, Inc.
MEASUREMENT AND CONTROL

SALES and SERVICE

WESTCOTT & GREIS INC. W&G MEASUREMENT & CONTROL

Come See -

4th International Pr

25th Year

TECHNICAL and SCIENTIFIC BLDG.

WESTCOTT & GREIS INC. W&G SUREMENT & CONTROL

Sales and Service

Westcott & Greis, Inc.
MEASUREMENT AND CONTROL

SALES and SERVICE

WESTCOTT & GREIS INC. W&G MEASUREMENT & CONTROL

-Booths 39-56
roleum Exposition

containing interesting exhibits of the following manufacturers:

1. METRIC METAL WORKS Meters
2. G. M. DAVIS Regulators
3. CHAPLIN-FULTON Regulators
4. RELIANCE MFG. COMPANY Regulators
5. CROSBY STEAM GAUGE & VALVE COMPANY
6. WESTCOTT & GREIS Safety and Conservation Tank Equipment.
7. PETROLEUM APPLIANCE COMPANY Master Mixer Head
8. D. MACDONALD & COMPANY Laboratory Meters and Testing Apparatus
9. BRISTOL COMPANY Regulating Instruments.

BOOTH 39 AND 56
Scientific and Technical Bldg.,
PETROLEUM EXPOSITION

Dallas --- TULSA --- Los Angeles

Westcott & Greis, Inc.
MEASUREMENT AND CONTROL

SALES and SERVICE

WESTCOTT & GREIS INC. W&G MEASUREMENT & CONTROL

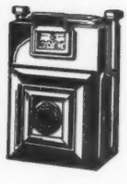
In Every Field of Measuring

TONKAWA
BURBANK
CUSHING
BRISTOW
SEMINOLE
N. CENTRAL & W. TEXAS
EASTERN

METRIC METERS

TEXAS PANHANDLE
E. CENTRAL TEXAS
GULF COAST
S. WEST TEXAS
SANTA FE SPRINGS
LONG BEACH
HUNTINGTON BEACH

are the Standard for Accuracy



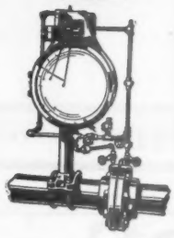
Orifice Meters: Introduced by Metric in 1915 and modernized time after time until today the most popular "general utility" meter for four measuring services—gas, oil, steam and water. "The *Standard for Accuracy.*"

Ironcase Meters: Pioneered by Metric and fashioned in various styles for specific services including: Drilling Well meters, Curb meters, Large Capacity—High Pressure meters, Positive Meters, Observation Meters, Prepay meters, etc. Only Metric makes Ironcase meters. Each in its class is the *Standard for Accuracy.*

Tin Meters: More than a million in service which were made by Metric craftsmen. These meters are of standard sizes, conservative capacities and have an established renown for *accuracy.*

Metrics: (Large Volume, [Positive] meters) manufactured by Metric Metal Works in 1926 and already in wide use because they answer today's greater demands in a new and better way. Also—the *standard of accuracy.*

Look around you wherever it may be from production work to consumer service—these Metric Meters constitute the sturdy **standards of accuracy** *in every phase of the many great oil and gas measuring responsibilities.*



METRIC METAL WORKS

of the American Meter Company, Inc.

ERIE - PENNSYLVANIA - U-S-A

Westcott & Greis, Inc.

MEASUREMENT AND CONTROL

SALES and SERVICE

WESTCOTT & GREIS INC. W&G MEASUREMENT & CONTROL

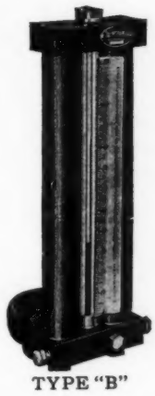
MERIAM INDICATING FLOW METERS

MERIAM Test or Indicating Flow Meters are used where accurate knowledge of the Rate of Flow is necessary and for a permanent check on Orifice Meters. They are made in three types for various kinds of work. The scales are made of aluminum with etched black figures that are easily read.

TYPE "B." This test meter stands 11" in height and weighs 12 pounds. It is machined from bar steel and steel tubes and is tested to 150 pounds working pressure. Should be used for GAS and AIR only, as the glands on this instrument are not packed to withstand hot oils.

TYPE "C." This instrument, which is gland packed, can be used with working pressures up to 1000 pounds, and can be used with GAS or AIR and with ANY LIQUID at ANY temperature.

Fitted with a safety overflow mercury chamber to prevent the accidental blowing over of the mercury into the line. The stuffing box at each end of the glass tube is packed with Johns-Manville "Jewett" rings, especially molded for this instrument.



TYPE "B"

New Type "D" now ready

TYPE "C"

New 100" Manometer now ready

MERIAM "U" TYPE MANOMETERS

Influenced solely by gravitation, the pressure readings above or below atmosphere, as indicated by MERIAM "U" TYPE MANOMETERS, are absolutely accurate. The frames are light in weight, being of cast aluminum, in one piece. The weight of the 50" size is only five pounds.

FOR TESTING: The 30" and 50" sizes are used extensively in testing and checking the accuracy of Orifice Meters and Low Pressure Recording Gauges. They are reinforced by skids or runners extending their entire length, thus making them durable and accurate instruments for laboratory or field use. The 100" size is of a collapsible type, with total range of 100 inches graduated in inches and tenths. Length of instrument for portable purposes is 57 inches.

Any MERIAM "U" TYPE MANOMETER can be used to accurately ascertain the Specific Gravity of any fluid.

All Manometers shipped from stock are supplied with scales graduated as given in our price lists. Inches and tenths graduations will be furnished unless otherwise ordered.

Westcott & Greis, Inc.

MEASUREMENT AND CONTROL

A. P. I. SPECIFICATIONS FOR OIL TUBULAR GOODS

(Continued from Page 264)

transfer medium, should be certified by the Bureau of Standards for lead, taper and form of thread. The standoff" ("S") of the ring gauge from the "last scratch" on the plug gauge may be specified by the purchaser as the amount equal to what he considers necessary to screw up by power and make a joint of the greatest possible strength, in which case the "S" value would be equivalent to the "A" value referred to above. The "standoff" value ("S") should in all cases be stamped on the certified ring gauge after calibration by the Bureau of Standards.

Definite values have been given for the "standoff" ("S") on certified plug and ring gauges in the gauge tables contained herein, to permit the stocking of master gauges by gauge manufacturers. There are also many manufacturers catering to a varied market, who supply couplings with various "A" values to suit the requirements of their customers, and for whom only one set of certified plug and ring gauges, with definite "S" values, are necessary to maintain uniform working plug gauges.

It should be borne in mind by the purchaser, however, that the "S" values as given for certified plug and ring gauges, are not compulsory, and do not apply when gauging the product, as the "standoff" "A" (which applies only to the product) is still undetermined on all grades of tubular goods except on drill pipe, for which definite "A" values have been included in the drill pipe thread tables.

Gauging Pipe

1. The certified master plug gauge represents the A.P.I. standard dimensions.

2. The distance "g" from last scratch (Figures 3, 5 and 8) of thread to gauge points is fixed by the standardization as equal to the imperfect threads.

3. The ring gauge has no standardized effective size. It has only its comparative step value "S" (Figures 3, 5 and 8) which may be determined to suit the gauge user.

4. The certified transfer ring gauge shall stand off from the last scratch of thread on the pipe and amount equal to the distance "S" (as determined from the certified master plug, Detail 4, Figure 9), plus or minus the allowable tolerance for the product; this insures that the pipe or working plug gauge is a duplication of the master plug thread.

5. A coupling or working ring gauge shall stand off from the last scratch of thread on the pipe an amount equal to the distance "A" (as determined from the certified master plug, Detail 3, Figure 9), plus or minus the allowable tolerance for the product. Distance "A" in this case is the number of threads exposed beyond end of coupling, hand-tight, desired by manufacturer to suit his material.

6. In case of dispute, no readings of

SPECIAL NOTE TO TABLE 11

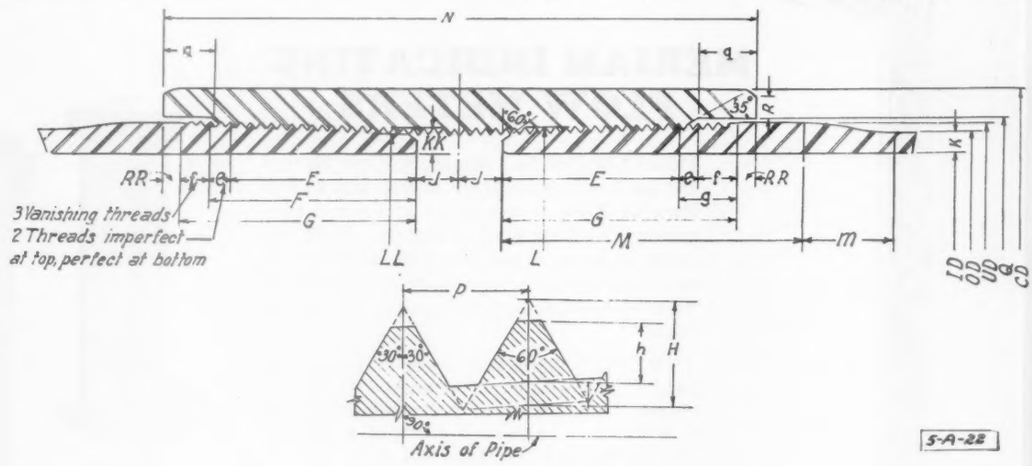
The following additional sizes of tubing were adopted at Colorado Springs:

3½ inch Plain (not upset).
3½ inch External Upset.
4 inch External Upset.

The detailed data for the thread and gauge tables are not yet available. Following are the principal dimensions:

(All Dimensions in Inches.)

Sizes—	3½" Plain	3½" External Upset	4" External Upset
Outside Diameter—"O.D."	4.000	4.000	4.500
Thickness of Shell—"K"	.226	.262	.271
Weight, finished	9.500	11.000	12.750
Outside Diameter of Upset—"O.D."	.....	4.500	4.750
Total length Upset—"M"	.....	4.000	4.250
Threads:			
No. per inch—"B"	10	10	10
Included Taper, Inches per ft.—"b"	3/4	3/4	3/4
Total length—"G"	2.375	2.500	2.625
Length Perfect Thread—"E"	1.875	2.000	2.125
Length Imperfect Plus Vanishing—"g"	.600	.600	.600
Height—"h"	.080	.080	.080
End of Tubing from Center of Coupling, made up—"J"	.600	.600	.600
Distances end of Coupling beyond last scratch, made up—"R.R."	.125	.125	.125
Couplings:			
Outside Diameter—"C.D."	4.750	5.000	5.5625
Length—"N"	6.000	6.250	6.500
Depth of Recess—"q"	.500	.500	.500
Diameter of Recess—"Q"	4.3125	4.3125	4.8125
Width of Bearing Face—"R"	.250	.250	.250



ENLARGED SECTION OF THREAD

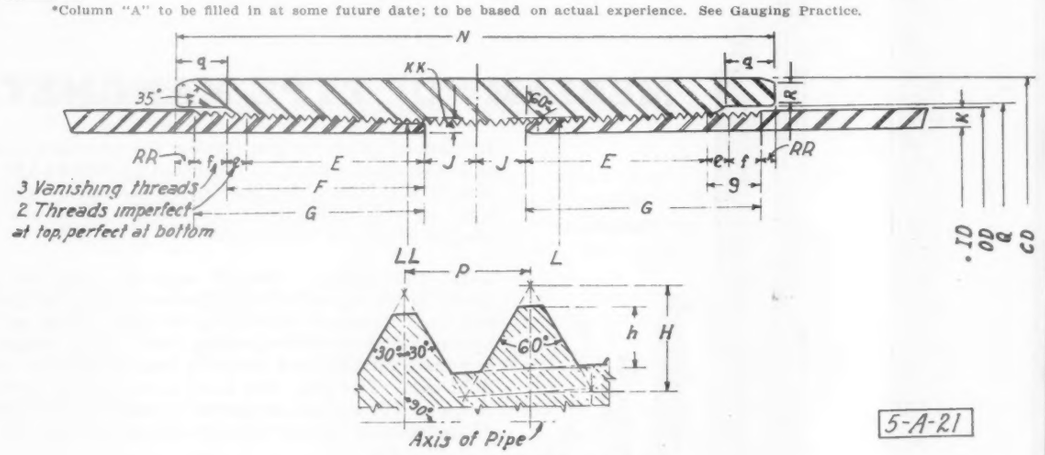
Figure 6

TABLE 10

A.P.I. STANDARD TUBING THREADS—PLAIN
See Figure 6
All Dimensions in Inches at 68 Degrees Fahrenheit
"Size" of A.P.I. Tubing Indicates NOMINAL Diameter.

Size	Outside Diam.—"O.D."	Wgt. Lbs. per ft., Finished	No. of Threads per In. "B".	Included Taper, Ins. per ft.—"b"	Total Length of Threads—"G"	Length of Thread to Gauge Point. "Length of Perfect Thread"—"E"	Length of Imperfect Plus Vanishing Threads—"g"	Height of Threads (Truncated)—"h"	Diam. at End of Tubing to Root of Threads "L.L."	Diam. at End of Tubing to Crest of Threads "L"	End of Tubing from Center of Coupling. Made Up—"J"	Distance End of Coupling Beyond Last Scratch. Made up. "R.R."	*Stand-off of Coupling at Hand Tight Fit—"A"
2	2.375	All	11½	¾	1.6250	1.1902	0.4348	0.06956	2.1615	2.3006	3/8	1/8	.....
2½	2.875	All	11½	¾	2.0625	1.6277	0.4348	0.06956	2.6341	2.7733	7/16	1/8	.....
3	3.500	All	11½	¾	2.3125	1.8777	0.4348	0.06956	3.2435	3.3826	1/2	1/8	.....
4	4.500	All	10	¾	2.5625	2.0625	0.5000	0.08000	4.2111	4.3711	1/2	1/8	.....

*Column "A" to be filled in at some future date; to be based on actual experience. See Gauging Practice.



ENLARGED SECTION OF THREAD

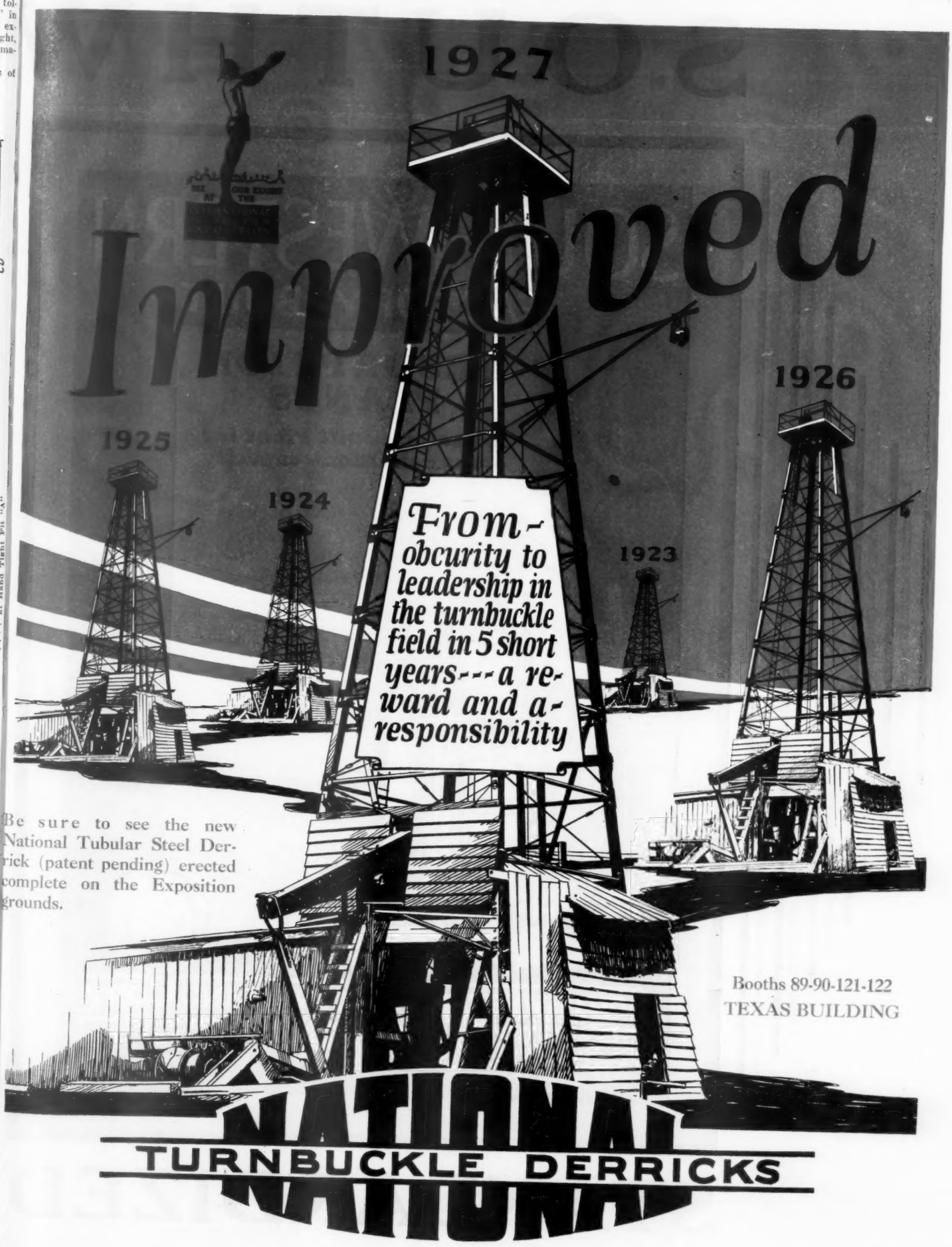
FIGURE 7—A.P.I. STANDARD TUBING—EXTERNAL UPSET

TABLE 11

A.P.I. STANDARD TUBING THREADS—EXTERNAL UPSET
See Figure 7
"Size" of A.P.I. Tubing Indicates NOMINAL Diameter.
All Dimensions in Inches at 68 Degrees Fahrenheit.

Size	External Diam. of Tube—"O.D."	Outside Diam. of External Upset—"D.D."	Weight, lb. per ft. Finished	No. Threads per Inch—"B"	Included Taper, in. per Ft.—"b"	Total Length of Threads—"G"	Length of Thread to Gauge Point. "Length of Perfect Thread "E"	Length of Imperfect Plus Vanishing Threads—"g"	Height of Threads (Truncated)—"h"	Diam. at End of Tubing to Root of Threads—"L.L."	Diam. at End of Tubing to Crest of Threads—"L"	End of Tubing from Center of Coupling. Made Up—"J"	Distance End of Coupling Beyond Last Scratch—"R.R."	*Stand-off of Coupling at Hand Tight Fit—"A"
1¼	1.660	1.8125	All	11½		1.3750	.9402	.4348	.06956	1.6146	1.7537	5/16	1/16	.....
1½	1.900	2.09375	All	11½		1.4375	1.0027	.4348	.06956	1.8919	2.0311	5/16	1/8	.....
2	2.375	2.59375	All	10		1.9375	1(4375	.5000	.08000	2.3439	2.5039	3/8	1/8	.....
2½	2.875	3.09375	All	10		2.1250	1.6250	.5000	.08000	2.8322	2.9922	7/16	1/8	.....
3	3.500	3.75000	All	10		2.3750	1.8750	.5000	.08000	3.4728	3.6328	1/2	1/8	.....

*Column "A" to be filled in at some future date; to be based on actual experience. See Gauging Practice.


1927
Improved
1926
1925
1924
1923
From obscurity to leadership in the turnbuckle field in 5 short years---a reward and a responsibility
Be sure to see the new National Tubular Steel Derrick (patent pending) erected complete on the Exposition grounds.
Booths 89-90-121-122
TEXAS BUILDING
NATIONAL
TURNBUCKLE DERRICKS
NATIONAL

SOUTHWE

SOUTHWESTERN
FACTORY BUILT

ABSORPTION PLANTS

A Factory Built Plant for every condition & capacity

Type 25 (PORTABLE)
2,500 to 3,000 Gallons

Type 75
7,500 to 10,000 Gallons

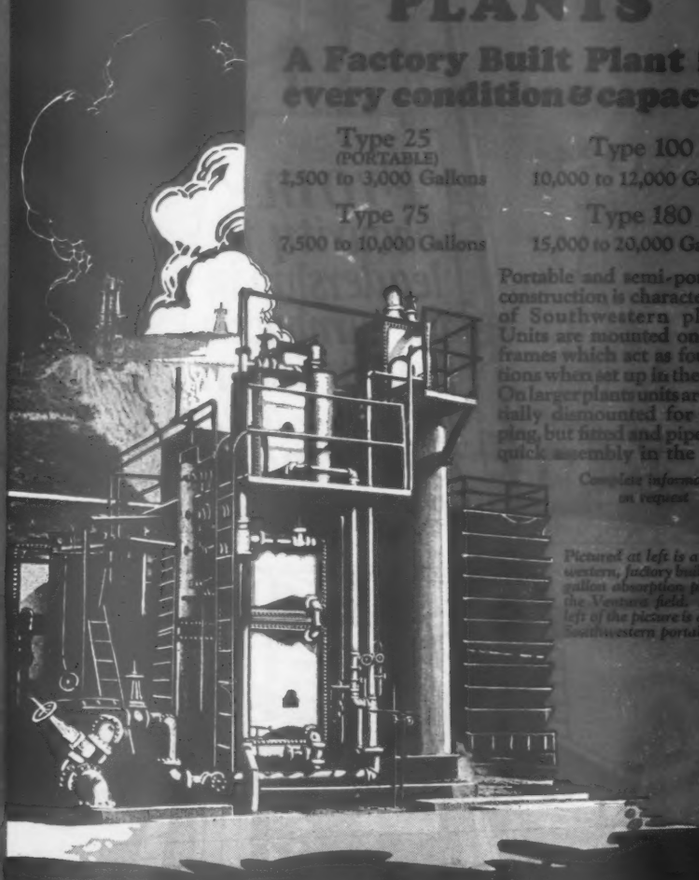
Type 100
10,000 to 12,000 Gallons

Type 180
15,000 to 20,000 Gallons

Portable and semi-portable construction is characteristic of Southwestern plants. Units are mounted on steel frames which act as foundations when set up in the field. On larger plants units are partially dismounted for shipping, but fitted and piped for quick assembly in the field.

Complete information on request

Pictured at left is a Southwestern, factory built, 7500 gallon absorption plant in the Ventura field. At the left of the picture is a small Southwestern portable.



SOUTHWESTERN ENGINEERING CORPORATION LOS ANGELES 1934

SOUTHWESTERN ENGINEERING CORP.
1221 HOLLINGSWORTH BLDG.
Los Angeles, Calif.

Offices
TULSA
AMARILLO, TEXAS
NEW YORK

Factories
CULVER CITY, CAL
TULSA

STANDARDIZED E

WESTERN

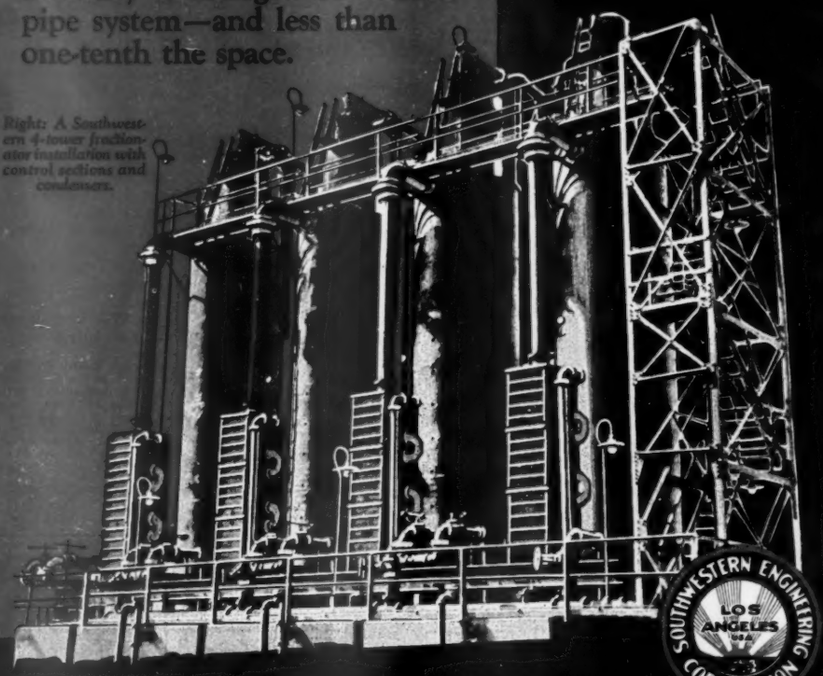
SOUTHWESTERN

CONDENSING SYSTEMS

(PATENTED)

The typical Southwestern Condensing System requires 80% to 90% less cooling surface than the ordinary submerged or double pipe system—and less than one-tenth the space.

Right: A Southwestern 4-tower fractionator installation with control sections and condensers.



SOUTHWESTERN ENGINEERING CORP.

1221 HOLLINGSWORTH BLDG.

Los Angeles, Calif.

Offices
TULSA
AMARILLO, TEXAS
NEW YORK

Factories
CULVER CITY, CAL.
TULSA

EQUIPMENT

thread size will be acceptable unless the transfer from the certified master plug is accomplished by a ring gauge with Bureau of Standards certification of lead, angle and taper as specified.

Gauging Couplings

1. The effective diameter of the thread of the coupling, except for drill pipe, is not standardized. Each manufacturer of couplings shall determine what value of standoff "A" is best suited to his material and methods of manufacture, basing his value "A" to produce a tight and full-strength joint when the last scratch of thread of the standard pipe is buried the required distance under the end of his coupling.

2. A certified master plug shall stand out of the coupling or working ring gauge an amount equal to the determinate distance "A" (Detail 3) Figure 9, plus or minus the allowable tolerance on the product.

3. A working plug gauge shall be calibrated by a ring transfer from a certified master plug gauge (Detail 5) Figure 9. The working plug gauge shall stand out of the coupling an amount equal to the determinate distance "A" (Detail 2) Figure 9, plus the working gauge calibration plus or minus the allowable tolerance on the product.

4. The manufacturer shall furnish on request to purchasers of his product the nominal value of the determinate "A" (Detail 3) Figure 9.

5. In case of dispute no readings will be acceptable other than those determined from a certified master plug gauge as in Detail 3, Figure 9.

Special Note—On drill pipe the stand-off "A" of coupling from the last scratch, hand-tight, shall be 4½ threads, or .450-inch on 10-thread and .5625-inch on 8-thread.

After sufficient experience (approximately a year) has been obtained by this method of gauging, it is contemplated that definite values may be assigned to dimension "A" as applied to casing and tubing.

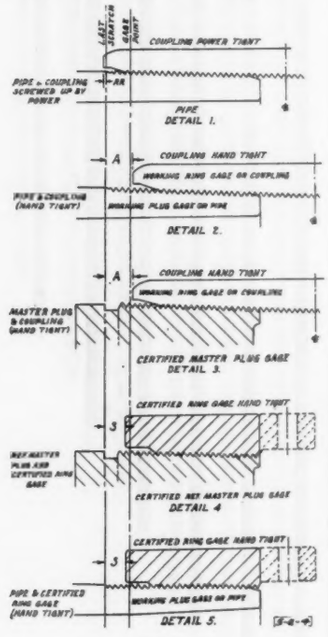


Figure 9

Conversion of Old-Style A.P.I. Tubular Gauges to Agree with 1926 Gauging Practice Revision

1. To convert old-style A.P.I. tubular gauges (See A.P.I. Pipe Specification No. 5-A, August, 1925) to agree with the new practice for gauging as specified herein, it will be convenient to make a change at the large end of the plug gauge, which will be a representation of the "last scratch" left by the dies on the pipe.

2. The ring gauges will not require any alteration whatsoever.

3. Figure 10 shows a notch ground in the fitting plate distance from the small end of the gauge by an amount equal to the total length "G" of the standard thread. This notch represents the "last scratch." From this notch is measured the "S" value as explained in detail in the section on gauging herein. (See Details 4 and 5, in Figure 9.)

4. This notch may be determined as in Paragraph 3 or by a measurement from the step of the plug, as follows:

Z=(E plus 1.000—G)

Where E=Length of perfect thread and G=Total length of thread.

5. When the last scratch notch has been correctly added to the plug, the ring gauge shall be stamped with the measured value of "S."

TABLE 12
A.P.I. STANDARD TUBING GAUGES
All Dimensions in Inchesat 68 Degrees Fahrenheit.

PLAIN TUBING GAUGES

See Figure 8. See Table 10 for thread lengths "E" and "G." See Table 8 for values of Recess diameter "Q."

Nominal Size	Outside Diam. "O.D."	Outside Diam. of External Upset "U.D."	No. of Threads per In.—"B"	Included Taper, Ins. per Ft.—"b"	Pitch Diam. at Gauge Point—"C"	Major Diam. at Gauge Point—"D"	Dis. from Gauge Point to Last Scratch—"g"	Width of Notch—"U"	Hgt. of Threads, (Truncated)—"h"	Pitch—"p"	*Stand-off—"S"
2	2.375	.....	11½	¾	2.30543	2.36335	.4348	.261±.100	.05791	.08696	.1848±.100
2½	2.875	.....	11½	¾	2.80543	2.86335	.4348	.261±.100	.05791	.08696	.1848±.100
3	3.500	.....	11½	¾	3.43043	3.48835	.4348	.261±.100	.05791	.08696	.1848±.100
4	4.500	.....	10	¾	4.42000	4.48660	.5000	.300±.100	.06660	.10000	.2500±.100

UPSET TUBING GAUGES

See Figure 8. See Table 11 for thread lengths "E" and "G." See Table 9 for values of Recess diameter "Q."

1¼	1.660	1.81250	11½	¾	1.74293	1.80085	.4348	.261±.100	.05791	.08696	.1848±.100
1½	1.900	2.09375	11½	¾	2.02418	2.08210	.4348	.261±.100	.05791	.08696	.1848±.100
2	2.375	2.59375	10	¾	2.51375	2.58035	.5000	.300±.100	.06660	.10000	.2500±.100
2½	2.875	3.09375	10	¾	3.01375	3.08035	.5000	.300±.100	.06660	.10000	.2500±.100
3	3.500	3.75000	10	¾	3.67000	3.73660	.5000	.300±.100	.06660	.10000	.2500±.100

*The purchaser may specify the "S" dimension to suit his requirements, ignoring the values given. In the absence of definite specifications for "S" from the purchaser, the values given above will be used. The calibrated value of "S" in any case must be stamped on the ring gauge. Fitting plates may be added to gauges if desired.

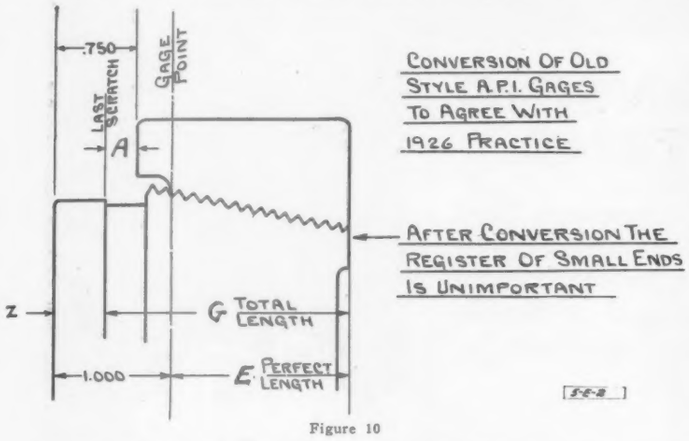


Figure 10

Examples

Description—	"G"	"E"	"Z"	"S"
4-3/4-10 Casing.	2.550	1.950	.400	.350
8-1/8-10 Casing	3.625	2.925	.300	.450
16-inch -10 Casing.	3.875	3.250	.375	.375
4-1/2 Drill Pipe	3.375	2.787	.412	.338

Gauging Products Used with A.P.I. Tubular Goods

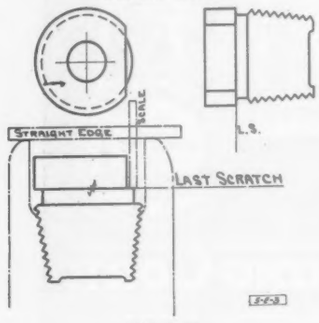


Figure 11

1. For the gauging of products used with A.P.I. tubular goods other than standard couplings, it may be desirable to represent the last scratch of thread on the master plug by a male step. A permissible method is shown in Figure 11.

DIMENSIONAL SYMBOLS FOR TUBULAR GOODS

All Dimensions Expressed in Inches at 68 Degrees Fahrenheit.

A=Stand-off of coupling from last scratch at hand-tight fit. (Product only.)

Threads

B=Number of threads per inch. (Gauges or product.)

b=Included taper; inches per foot. (Gauges or product.)

C=Pitch diameter at gauge point; equals "D" minus "h." (Gauges or product.) (See Special Note.)

D=Major or crest diameter of thread at gauge point (after truncation); equal to "C" plus "h." (Gauges or product.) (By "truncation" is meant the flattening or rounding of thread root and thread crest, as distinguished from the sharp "V" crest and root.) (See Special Note.)

d=Minor or root diameter of thread at gauge point (after truncation.) (Gauges or product.) (See Special Note.)

E=Length of perfect threads. (Gauges or product.)

e=Length of thread imperfect at top and perfect at bottom.

F=Effective length of thread; equal to "E" plus "e." (Gauges or product.)

f=Length of vanishing threads.

G=Total length of threads.

g=Length of vanishing threads plus imperfect threads; equal to "G" minus "E." (Product only.)

G.P.=Gauge Point. (Gauge or product) Location at "G" minus "g."

H=Theoretical height of thread (before truncation). Measured perpendicular to the axis.

h=Height of thread after truncation; or equal to (D—d)/2 on the product. On gauges it is measured from the crest of the thread on the plug to the crest of the thread on the ring at any given diameter. (See Special Note.)

P=Pitch, equals distance between corresponding points on any two consecutive (perfect) threads, measured parallel to the axis; equal to 1/B.

Dimensions of Product

O.D.=Outside diameter of pipe. (Product only.)

I.D.=Inside diameter of pipe. (Product only.)

U.D.=Outside diameter of external upset. (Product only.)

M.D.=Inside diameter at end of internal upset. (Product only.)

N.D.=Inside diameter, full, of internal upset. (Product only.)

J=Distance of end of pipe from center of coupling, made up. (Product only.)

K=Wall thickness. (Product only.)

K.K.=Thickness of wall at end of pipe to top of thread. (Product only.)

L=Diameter at end of pipe at crest of threads. (Product only.)

L.L.=Diameter at end of pipe at root of threads; equal to "L" minus "2h." (Product only.)

M=Length of upset. (Product only.)

m=Length of taper on upset. (Product only.)

N=Length of coupling. (Product only.)

O=

P=Pitch. (See above.)

C.D.=Outside diameter of coupling. (Product only.)

Q=Diameter of recess in coupling. (Product only.)

q=Depth of recess in coupling. (Product only.)

R=Width of bearing face on coupling. (Product only.)

R.R.=Distance, end of coupling beyond last scratch, made up by power. (Product only.)

Gauge Dimensions

S=Stand-off or step value of ring gauge from last scratch at hand-tight fit. (Gauge only.)

T.P.=Total length of plug gauge. (Gauge only.)

T.R.=Total length of ring gauge. (Gauge only.)

T=

U=Width of notch in A.P.I. gauges. (Gauges only.)

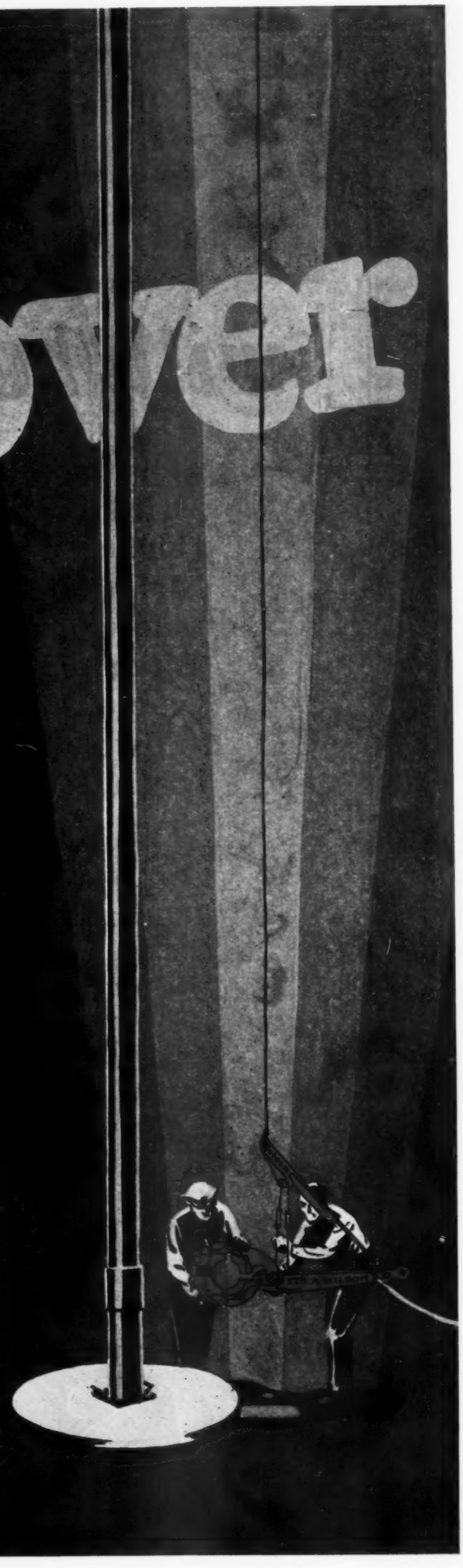
Special Note: Symbols "D," "h," and "d" can be used on either gauges or product, but the numerical value of the dimensions may vary between the gauges and the product, in as much as the height of thread "h" (which influences the major diameter "D" and minor diameter "d") is truncated a larger amount on the gauge than on the product, in order to avoid interference.

C. D. WATSON

Member A.P.I. Pipe, Rigs and Derricks and Rig Iron Standardization Committees.

A Wilson improvement-

Rollover



Wilson Casing Tongs now have a Lever and Hanging Device that permits reversal within 10 seconds. The Boys in the field are "for it" 100%.

Painted Chinese Red. At Leading Supply Houses.

Wilson Oil Tools Corp.

DISTRIBUTORS FOR

Wilson & Willard Mfg. Co.

Factory and Distributor's Office — It's a Wilson — 2301 East Vernon Ave

Los Angeles, Calif.

Sales Representatives

TULSA, OKLA. 409 Atlas Life Bldg.

HOUSTON, TEXAS 219 Post Dispatch Bldg.

AMARILLO, TEXAS 1501 Polk St.

WICHITA FALLS, TEXAS 232 Bob Waggoner Bldg.

A NEW GA

will be on display at -th

The increasing demand for an enclosed type, self-lubricating pump for large capacities and higher pressures has been the prime motive for our manufacturing a pump of the type we are showing at the International Petroleum Exposition, Booths 89-121, Texas Building. The new pump is called our Gaso Duplex Enclosed Type Power Pump (Center herringbone gear, Interchangeable liners). Fig. 710.

This pump which is designed for pumping oil or water at pressures up to 1400 pounds per square inch, has many distinctive features:

1.—Every working part of the pump is enclosed, being oil tight and dust proof.

2.—It is entirely self lubricating, every working part running in an oil bath.

Booths 89-121

Gaso Pump & Burner Mfg Co

GASO OIL IND

ASO PUMP

the Petroleum Exposition

3.—Equipped with Open hearth steel continuous tooth herringbone gears, center driven, running in oil, assuring the highest efficiency and quietness of operation.

4.—Has inter-changeable liner fluid end in sizes from 2½" to 7" with 10" stroke. The liners and pistons can be replaced quickly and easily to meet any change in working conditions.

5.—The pinion shaft bearings are Timken Taper Roller Bearings. The main bearings are lined with genuine babbitt and both are easily adjustable to wear.

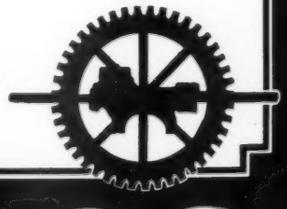
6.—Pumps can be furnished with pulley for belt drive, with electric motor mounted on the frame and driven thru Silent-Chain or Fibre pinion and steel gear, or direct connected thru flexible coupling for engine drive.

7.—Allowance has been made for different gear ratios to suit driving conditions. Making this pump an ideal pump for any pumping conditions of a general nature.

We show this pump in actual operation, at our booths. Do not fail to see it.

Texas Building

Co., Tulsa, Oklahoma, U. S. A.



USTRY PUMPS

VULCAN STEEL TANK CORP. TULSA, OKLA.

VULCAN TANKAGE

ENGINEERS & MFGRS. of LIGHT & HEAVY STEEL PLATE WORK

Announcement

The plant of the Vulcan Steel Tank Corporation, shown above, is now open and ready to serve the trade with riveted or welded steel tanks of every size and description. This plant is fully equipped with all modern facilities for high grade manufacture of steel plate construction.

Although the VULCAN plant is new, it is manned by a thoroughly trained organization, under a management that has had 40 years of experience in catering to the peculiar needs of the oil refinery trade. Inquiries concerning tankage are now invited.

J. F. McKelvey, Pres. J. S. Warren, V-Pres. E. P. Day, Sec'y

VULCAN STEEL TANK CORP.

Tulsa, Oklahoma

P. O. Box 1844
Phone, Rural 123

Office and Plant,
N. Harvard & Frisco R.R.

A. P. I. SPECIFICATIONS ON ROTARY TAPER JOINTS

(Continued from Page 248)

joints is 3 inches per foot, or 1 in 4, measured on the diameter, except the 5 by 6—4, which is 2 inches per foot, or 1 in 6, measured on the diameter.

3-e. New Sizes of Rotary Drilling Taper Joints: Should any other size of

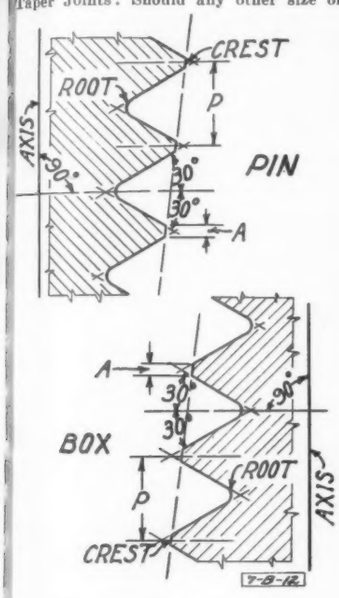


Figure 1—Basic thread form.

joint than now adopted be required, it shall be the duty of the American Petroleum Institute to develop same, that such might immediately become a standard and when a new joint is developed every manufacturer will be notified at once.

Section 4—Reference Master Gauges: Certification

4-a. Anyone desiring to produce A. P.I. standard rotary drilling taper joints shall provide himself with reference master gauges which have been manufactured in accordance with the dimensions and tolerances specified in Section 6, such reference gauges to be checked and certified by any A.P.I. custodian or the Bureau of Standards in Washington. form of certificate to be as specified in Paragraph 5-k.

4-b. When a manufacturer is prepared and ready to order and use the standard rotary drilling reference master gauges, he shall apply to the American Petroleum Institute for a certificate of authority to use the official A.P.I. monogram, for each size of gauge desired, which shall be his authority to purchase and use such gauges.

4-c. The American Petroleum Institute, shall, upon receipt of an application for certificate, issue a certificate in duplicate for each size gauge, the duplicate to be sent with order to the reference master gauge manufacturer, who is to be instructed that such will be his authority to furnish.

4-d. The original certificate shall be kept by the manufacturer to whom issued as his authority to use the official monogram of the American Petroleum Institute on rotary drilling taper joints.

4-e. All rotary drilling taper joint reference master gauges shall be numbered consecutively by the manufacturer, the numbers to be supplied on the certificate issued by the American Petroleum Institute.

4-f. The American Petroleum Institute shall keep a careful record of the certificates, sizes and numbers of reference master gauges and to whom furnished.

4-g. The American Petroleum Institute shall furnish to each rotary drilling taper joint manufacturer who has purchased and has in use the American Petroleum Institute reference master gauges, a record of all licensed users, showing sizes and numbers.

4-h. Should a manufacturer sell out or dispose of his business, carrying with it officially furnished reference master gauges for rotary drilling taper joints, the purchaser may have the certificates transferred upon request and the return of the old certificates to the American Petroleum Institute.

4-i. Should a reference master gauge for any rotary drilling taper joint be destroyed or lost, the manufacturer should return the certificate with explanation to the American Petroleum Institute in order that their records may at all times be correct.

Section 5—Testing of Reference Master Gauges

5-a. The American Petroleum Institute will provide suitable means for testing reference master gauges to be placed with reliable custodians at points to be determined where for a moderate fee each manufacturer of rotary drilling taper joints may have his gauges tested as often as he desires, but to be not less than once a year because the burden of keeping the working gauges to true form and sizes will rest with the manufacturer.

5-b. The set of A.P.I. grand master gauges for rotary drilling joints shall be deposited with the Bureau of Standards at Washington, D. C., and the special reference master gauges held by custodians for testing purposes shall be tested against the grand master gauges from time to time as may be desirable.

5-c. These tests shall consist of the following:

5-d. The test for general size shall be made by screwing the taper plug into the A.P.I. taper ring gauge and measuring the projection of the large end of the plug from the ring. In similar manner the taper ring shall be screwed firmly on the A.P.I. taper plug and a measurement made of the projection of the large end of the plug from the ring. In both cases the projection of the plug from the ring should measure 0.625 inch.

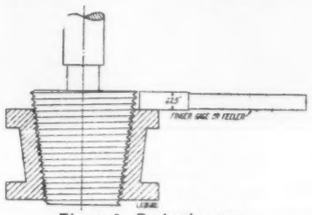


Figure 2—Projection test.

Projection Test

5-e. The pair of reference gauges being tested, when screwed firmly together, should also meet the foregoing requirements. A record of these measurements will be furnished the manufacturer of rotary taper joints who submits the reference master gauges for test.

W. C. TROUT
Rotary Drilling Equipment.

Projection Tolerances on Reference Master Gauges

5-f. New reference master gauges, within the following limits, shall be considered satisfactory:

(a) Projection of any plug from its mating ring shall be: Minimum, 0.624 inch; maximum, 0.626 inch.

(b) Projection of any plug or ring gauge interchanged with any other ring or plug gauge, including A.P.I. reference master gauges, shall be: Minimum, 0.621 inch; maximum, 0.629 inch.

Special Note—This is a test on projection only. For permissible limits on other elements, see gauge tables appended.

F. E. BERNSEN
Rotary Drilling Equipment.

General Instructions for Testing Reference Master Gauges

5-g. During the test all pieces entering into the measurement shall be at a uniform temperature near 68 degrees Fahrenheit.

5-h. Gauges shall be benzol clean before mating, and made up with a thin film of sperm oil wiped on the threads with clean chamois skin or bristle brush.

5-i. The pair shall be mated hand tight without spinning into place and complete register shall be accomplished with the torque hammer specified for each size. (See table of weights below and Figure 3.)

Table of Weights

Two-pound weight for 2⅜ and 2⅞ gauges.

Three-pound weight for 3½ and 4½ gauges.

Four-pound weight for 5⅛, 6⅝ and 8⅝ gauges.

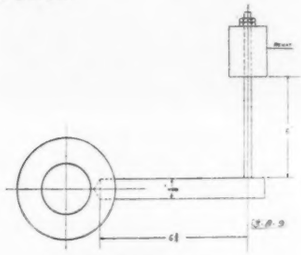


Figure 3—Torque hammer.

Torque Hammer

5-j. The number of torque hammer blows is unimportant. Sufficient number should be made so that continued hammering will not move ring relative to plug.

5-k. Report on Tests of Reference Master Gauges: The reports on tests of reference master gauges shall be made in the following form:

Test of .....Rotary drilling taper joint
Reference master gauges, size.....
No..... Date.....
Tested by .....
at .....

	Ring or Shell of Gauge	Plug or Pin of Gauge
Projection from A.P.I. gauge		
Record of gauges to be tested:		
Projection before testing with A.P.I. gauges		

5-l. Disputes: In case of any dispute regarding the accuracy of any A.P.I. gauge listed hereunder, it shall be referred to the Bureau of Standards, Washington, D. C., for final decision.

Section 6—Specifications for Master Gauges

6-a. All A.P.I. reference master gauges (including grand and special reference masters) shall be hardened and ground steel gauges, as specified in tables appended. They may be manufactured with a fitting plate or ring, as illustrated. The plug gauge (or master pin gauge) in all cases shall be the standard.

6-b. The thread form on these gauges shall be the basic thread form specified for the rotary drilling taper joints, except that the crests shall be truncated 0.04808-inch for 4-thread and 0.03946-inch for 5-thread in the 3-inch per foot taper, and 0.04820-inch for 4-thread in the 2-inch per foot taper, while the roots may be undercut to prevent the gauge from bearing on the crest of the thread on the product.

Section 7—Method of Gauging Boxes and Pins (Tentative)

7. The following gauging practice has been adopted (June, 1927), subject to revision as future experience may warrant:

7-a. The stand-off valve of the product pin in the ring gauge to be 0.625 to 0.655-inch (see Figure 4).

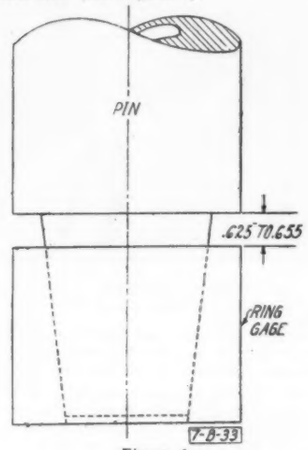


Figure 4.

7-b. The stand-off valve of the product box from the pin gauge to be 0 to 0.010-inch (see Figure 5).

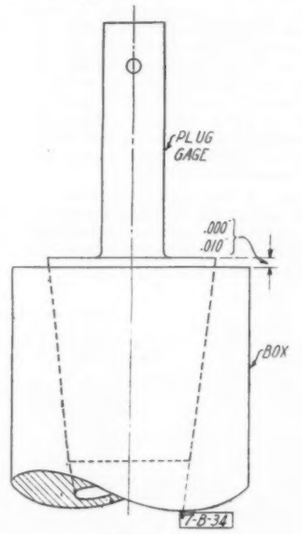


Figure 5.

7-c. The taper in the product boxes shall be one-sixteenth inch per foot less than the taper on the product pin.

Special Note—In making these recommendations on gauging practice, the committee feels it is probable that with such a system

joints made near the limits specified will come tight on the taper either just as they shoulder, or a little before they shoulder, and that the practice will not result in loose tool joints, the real problem being to make joints interchangeable when made in various shops.

Section 8—Recommended Practice for Turning Threads

(See paragraph 7-c; to be amplified later.)

Section 9—Inspection

9-a. The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed to all parts of the manufacturer's works which will concern the manufacture of the material ordered hereunder. The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be made at the place of manufacture prior to shipment, unless

E. D. SHELL
Rotary Drilling Equipment.

otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

9-b. Where inspector representing the purchaser desires to witness these tests, reasonable notice shall be given of the time at which the run is to be made.

Rejection

9-c. Material manufactured in accordance with these specifications which proves to be defective subsequent to acceptance at manufacturer's works or when properly applied in service, may be rejected and the manufacturer shall be notified. No rejections, under these or any other specifications, are to be stamped or marked with the A.P.I. monogram or sold as A.P.I. material. When material stamped or marked with the A.P.I. monogram is rejected, such monogram shall be cancelled as follows:

9-d. A steel cancelling stencil, one-half inch square, per the following figure, shall be applied twice, first horizontally, the stencil then turned 90 degrees and applied the second time.

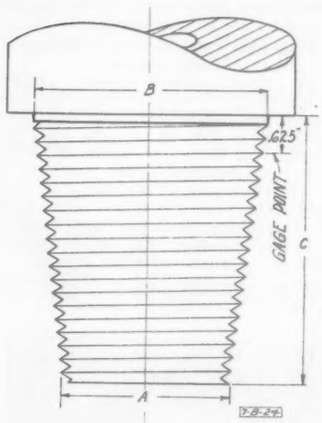


Figure 6.

Figure 7—Feeler gauge.

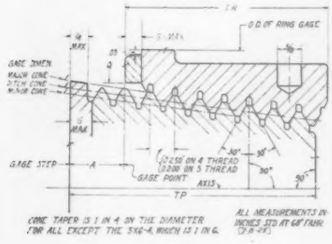

O.D. OF RING GAGE
GAGE STEP
GAGE POINT
TP
CONE TAPER IS 1 IN 4 ON THE DIAMETER FOR ALL EXCEPT THE 5"X6-A WHICH IS 1 IN 6.
ALL MEASUREMENTS IN INCHES AT 68° FAHR.

Figure 8.

Note—"G" (fitting plates), which is a maximum dimension, equals .437-inch for 6⅝-inch and 8½-inch sizes, and equals .375-inch for all other sizes.

HUGH N. WEST
Rotary Drilling Equipment.

TABLE 1
A.P.I. Standard Rotary Taper Joints
See Figures 1 and 6
Taper joints shall be identified by the drill pipe size.
All dimensions in inches at 68 degrees Fahrenheit.

Size of Drill Pipe	Nominal Size of Taper Joint	Small Diameter of Pin—"A"	Large Diameter of Pin—"B"	Length of Pin "C"	Number of Threads per In.	Taper of Joint Inches per Ft.	Form of Thread
2-3/8	1-7/8x2-5/8 -5	1.875	2-5/8	3	5	3	V-.040 Flat
2-7/8	2-1/8x3 -5	2.125	3	3-1/2	5	3	V-.040 Flat
3-1/2	2-9/16x3-1/2-5	2.562	3-1/2	3-3/4	5	3	V-.040 Flat
4-1/2	3-9/16x4-5/8-5	3.562	4-5/8	4-1/4	5	3	V-.040 Flat
5-9/16	4-1/2x5-1/2 -4	4.333	5-1/2	4-3/4	4	3	V-.050 Flat
6-5/8	5 x 6 -4	5.159	6	5	4	3	V-.050 Flat
8-5/8	7 x 8 -4	6.608	8	5-3/8	4	3	V-.050 Flat

Special Note—Dimensions "A" and "C" for the first four (4) sizes are absolute dimensions from which gauge valves in Table 2 are computed. Dimensions "A" and "C" for the last three (3) sizes are approximately accurate, but the valves in gauge table No. 2 are based on pitch diameters given by U. T. Co. and E. H. S. Co.

TABLE 2
Gauge Dimensions for A.P.I. Standard Rotary Drilling Taper Joints
See Figures 7, 8 and 9. All dimensions in inches at 68 degrees Fahrenheit. Taper joints shall be identified by the drill pipe size.

	1	2	3	4	5	6	7	
Size of Drill Pipe	Nominal Size of Tapered Joint	Taper, Inches per Foot	Pitch Dia. at Gauge Point	Major Cone Dia. at Gauge Step	Minor Cone Dia. at Gauge Point	Total Length Plug Gauge "TP"	Total Length Ring Gauge "TR"	Outside Dia. of Ring Gauge O.D.	Dia. of Recess "Q"	Step Value
2⅜	1-7/8x2-5/8-5	3	2.36537	2.61500	3.27199	3	3⅜	3.750	2.531	0.6
2⅞	2-1/8x3-5	3	2.74037	2.99000	2.64699	3½	3⅞	4.250	2.906	0.6
3½	2-9/16x3-1/2-5	3	3.23987	3.48950	3.14649	3¾	3¼	5.000	3.406	0.6
4½	3-9/16x4-5/8-5	3	4.36487	4.61450	4.27149	4¼	3⅝	6.250	4.531	0.6
5-9/16	4-1/2x5-1/2-4	3	5.23515	5.51063	5.11592	4⅝	4⅛	7.500	5.427	0.6
6⅝	5 x6 -4	4	5.75830	5.98207	5.63870	5	4⅝	8.250	5.949	0.8
8⅝	7x8 -4	4	7.66658	7.94206	7.54736	5⅝	4⅝	10.750	7.858	0.8

The values contained in Table 2 apply to either right or left hand threads.
When ordering gauges the purchaser should specify whether right hand or left hand threads are desired.
The gauge point is to be 0.625-inch from the plug gauge shoulder.
Tolerances: Col. 2 = ± 0.002-inch; Col. 3 = ± 0.002-inch; Col. 4 = ± .00 inch; Col. 5 = ± 0.004-inch; Col. 6 = Dia. ± 0.005-inch; Col. 7 = ± .015-inch.

Tolerances on A.P.I. Rotary Tool Joint Gauges

Plug

1. The plug shall be the control.

2. The lead may vary ±1/10000-inch per inch of length from basic, and shall be measured over a length of axis beginning and ending not less than one-half inch from the ends of the threaded portion, but the tolerance for gauges, the "TR" length of which is less than 4 inches, shall be ±4/10000-inch from basic.

Example 1. A 6⅝-inch plug lead measures 3.9996 inches for 16 threads giving a minus error of 0.0005-inch for 5 inches which is allowable.

Example 2. A 3½-inch plug lead measures 1.9996 inches for 10 threads giving a minus error of 0.00075-inch in the full threaded length of 3¾ inches which is not allowable.

3. The included taper on diameter in the length "TR" shall lie between the limits (basic) and (basic + TR/10000 inches) and shall be measured over length of axis beginning and ending not less than one-half inch from the ends of the threaded portion, but the limits for gauges, the "TR" length of which is less than 4 inches, shall be (basic) and (basic + 4/10000 inches).

Example 1. A 6⅝-inch plug measured over 3 inches of axis gives a difference of diameter readings of 0.5004. This error, increased in proportion to the TR length, is
(4.375/3) (0.0004)=0.000583
which is not allowable since the plus tolerance is 0.0004375.

Example 2. A 3½-inch plug measured over 2½ inches of axis gives a difference of diameter readings of 0.6252-inch. This error, increased in proportion to the TR length, is
(3.125/2.500) (0.0002)=0.00025.
The tolerance is 0.0004 and therefore the error is allowable.

4. The flanks of the thread may vary from the basic angle of 30 degrees to the normal by not more than ± 7 minutes of arc.

5. The pitch diameter at the gauge point shall lie between the limits (basic ± TR/10000 inches), but the limits for gauges, the "TR" length of which is less than 4 inches, shall be (basic ±4/10000 inches).

6. The above tolerances are subject to the additional condition that the plug must screw into a regional A.P.I. reference master to a step value between the limits 0.621-inch and 0.629-inch.

S. B. TERRY
Rotary Drilling Equipment.

Ring

1. The ring shall be controlled by its engagement with the mating plug.

2. The step value may vary between the limits 0.624-inch and 0.626-inch.

3. The included taper on diameter in the length "TR" shall lie between the limits (basic —4/10000 inches) and (basic —12/10000 inches) for all sizes and shall be measured over a length of axis beginning and ending not less than one-half inch from the ends of the threaded portion.

4. The above tolerances are subject to the additional condition that the ring must screw onto a regional A.P.I. reference master to a step value between the limits 0.621-inch and 0.629-inch.

5. The flanks of the thread may vary from basic angle of 30 degrees to the normal by not more than ± 15 minutes of arc.

TABLE 3
Thread Heights—Product and Gauges
See Figure 9.
All dimensions in inches at 68 degrees Fahrenheit.

				Crest Truncation		Root Truncation		
Number of Threads per In.	Pitch—"p"	Taper, Ins. per Ft.	Height before Truncation—"H"	On Product "b"	On Gauge "bb"	On Product "c"	On Gauge "cc"	Half of Theoretical Full Thread Height
5	0.200	3	.172303	.03446	.03946	.03446	.03946	.0861
4	0.250	3	.215379	.04308	.04808	.04308	.04808	.1079
4	0.250	2	.216005	.04320	.04820	.04320	.04820	.1080

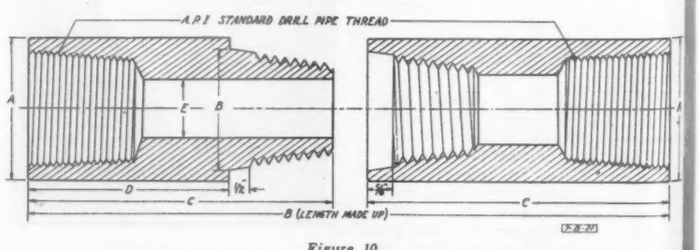
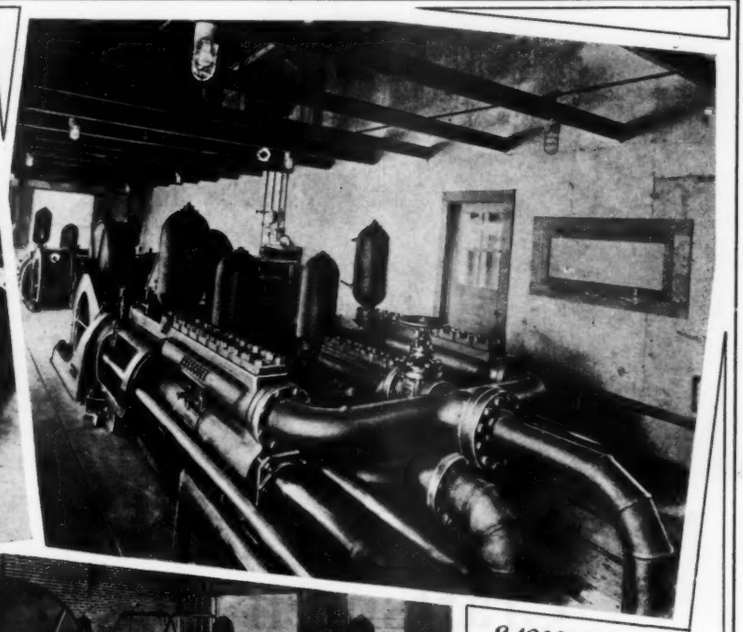


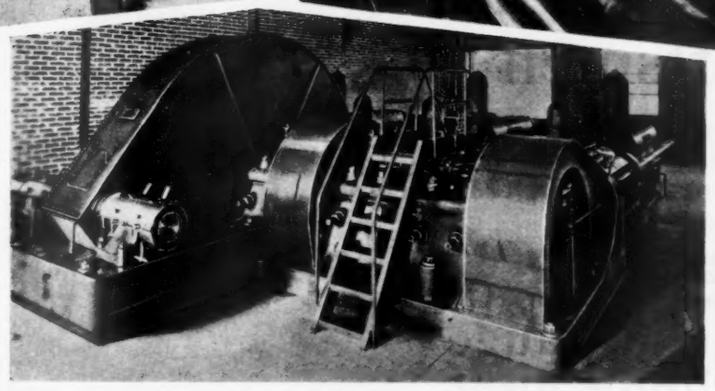
Figure 10.
Note: Dimension "B" is over-all length when made up.

PRESCOTT-MENOMINEE

40,000 Bbl. ELECTRIC PUMP
Working pressure 900 lbs. per sq.in.
COUNCIL HILL STATION
Oklahoma Pipe Line Co.



2-12000 Bbl. Capacity
ELECTRIC PUMPS
LIMA STATION
Okla. Pipe Line Co.

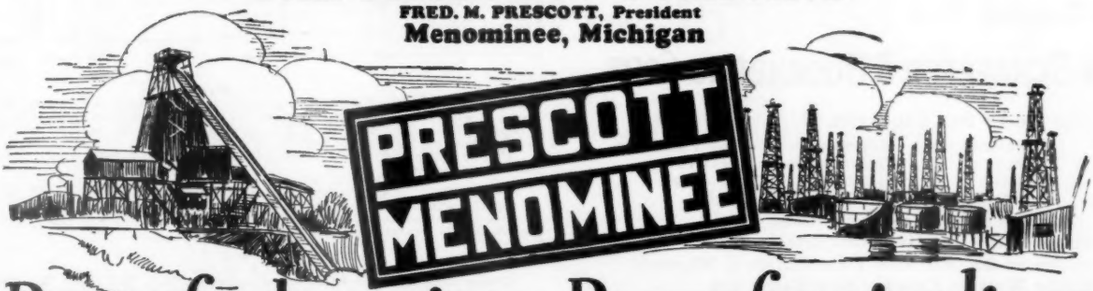


40000 Bbl. ELECTRIC PUMP Working pressure 900 lbs. per sq.in.
KINTA STATION. Oklahoma Pipe Line Co.

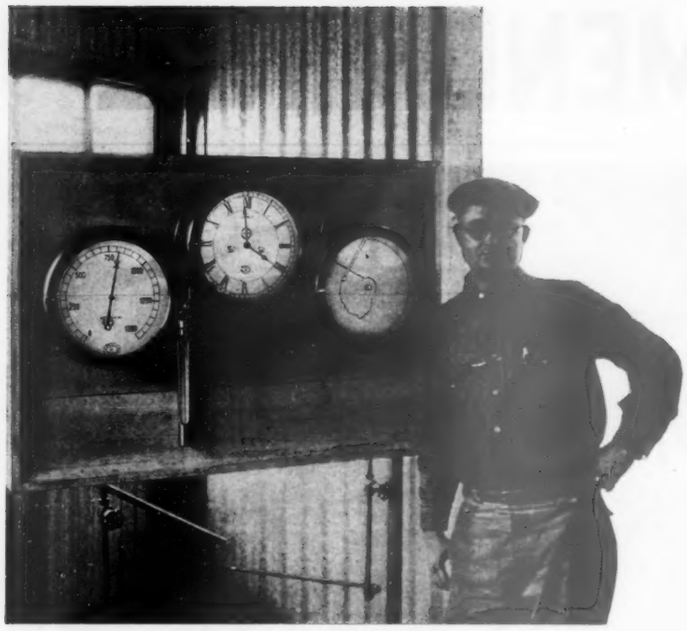
Electric Pipe Line Pumps

Dependable Economical
Accessible Sturdy
Capacity Well Built

THE PRESCOTT COMPANY
FRED. M. PRESCOTT, President
Menominee, Michigan



Pumps for deep mines ~ Pumps for pipe lines



Made by Old-Time Craftsmen

At this booster station of the Ozark Pipe Line Corporation, at Seminole, Okla., American Industrial Instruments have been selected for their accuracy. This gauge board consists of an

AMERICAN
Hydraulic Gauge
Recording Gauge
and Clock

The same set of instruments is used at the stations at Holdenville, Avant, Braman, Cushing and throughout the oil fields.

Mr. T. C. Claxton, engineer at Seminole, writes:—"I find them to be accurate and satisfactory in every way."

The old-time craftsmanship which goes into the making of American Industrial Instruments is thus reflected in the finished product. That is why they remain accurate even under the most severe working conditions.

Write for our Catalog N-5.

AMERICAN SCHAEFFER & BUDENBERG CORP.

338 Berry St., Brooklyn, N. Y.

Atlanta	Cleveland	Minneapolis	*San Francisco
*Boston	Detroit	Philadelphia	*Seattle
Buffalo	Houston	*Pittsburgh	St. Louis
*Chicago	*Los Angeles	Salt Lake City	*Tulsa

*Stock carried at these branches.

Direct Factory Representatives for Eastern Canada:
Mechanical Equipment Co., 807 New Birks Building, Montreal.
For Middle Western Canada: Kipp-Kelly, Ltd.
68 Higgins Ave., Winnipeg

Thread Heights

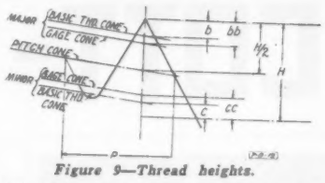


Figure 9—Thread heights.

Marking—Tool joints manufactured in accordance with these specifications shall be stamped with the manufacturer's name or identifying mark and the A.P.I. monogram. The size of the joint and the A.P I. monogram shall be stamped on both the box and pin around the outside.

Example: A 6⅝"-5 by 6"-4 tool joint should be stamped as follows: 6-5/8.

The location of the manufacturer's name or identifying mark is optional with the manufacturer. Each manufacturer shall file with the A.P.I. a description of his private mark, and the location used, which will be furnished to anyone on request.

Marking—Fishtail bits manufactured in accordance with these specifications shall be stamped on the blade with the size of joint, manufacturer's name or identifying mark, and the A.P.I. monogram. For example: a 5 by 6-4 joint should be marked with letters and figures one-quarter inch high, as follows:

6-5/8—A. B. Co.

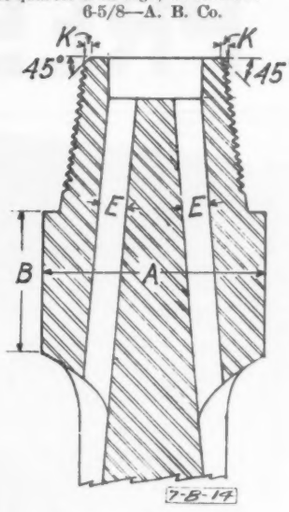


Figure 11—Fish-tail bits.

TABLE 4
Dimensions of A.P.I. Standard Rotary Tool Joints

All dimensions in inches at 68 degrees Fahrenheit. Taper joints shall be identified by the drill pipe size.

Size of Tool Joint*	Pin Dimensions	Outside Diameter of Tool Joint "A"	Tol.	Combined Length of Box and Pin, Made Up "B"	Tol.	Length of Tool Joint Box or Pin "C"	Tol.	Length Minus Pin, Approx. "D"	Tol.	Bore "E"	Tol.
2⅜	1⅞x2⅜-5	3¼	±1/32	16"	±¼ −1	9½	+⅛ −½	6½	1	+1/64 −1/32
2⅞	2⅛x3 -5	3¾	±1/32	17"	±¼ −1	10¼	+⅛ −½	6¾	1¼	+1/64 −1/32
3½	2 13/16x3½-5	4¼	±1/32	18"	±¼ −1	10⅞	+⅛ −½	7⅛	1½	+1/64 −1/32
4½	3 13/16x4⅝-5	5½	±1/32	20"	±¼ −1	12⅛	+⅛ −½	7⅞	2¼	+1/64 −1/32
5 13/16	4½x5½-4	6⅝	±1/32	22"	±¼ −1	13⅜	+⅛ −½	8⅝	2¾	+1/64 −1/32
6⅝	5x6 -4	7¾	±1/32	24"	±¼ −1	14½	+⅛ −½	9½	3½	+1/64 −1/32
8⅝	7x8 -4	10	±1/32	28"	±¼ −1	16¾	+⅛ −½	11⅜	4¾	+1/64 −1/32

*"Size" of tool joint to be the outside diameter of drill pipe to conform with A.P.I. drill pipe standards. The threads in the pipe ends of all tool joints shall be turned to fit the A.P.I. standard drill pipe specified, in accordance with A.P.I. Standards No. 5-A: "A.P.I. Pipe Specifications," except 8⅝-inch outside diameter, which has not been adopted as standard.

TABLE 5
A.P.I. Standard Fish-Tail Bits

See Figure 11

Taper joints shall be identified by the drill pipe size. All dimensions in inches at 68 degrees Fahrenheit.

Size of Drill Pipe	Nominal Size of Joint	Shoulder Dimensions: Diameter "A"	Tol.	Min. Height Approx.—"B"	Bevel—"K"	Water Hole Dimensions*: Number	Size—"E"
2⅜	1⅞x2⅜-5	3¼	±1/32	1	3/16"x45°	...	...
2⅞	8⅛x3 -5	3¾	±1/32	1	¼"x45°	...	...
3½	2⅝x3½-5	4¼	±1/32	1	¼"x45°	...	...
4½	3⅝x4⅝-5	5½	±1/32	1	¼"x45°	2	¾
5 13/16	4½x5½-4	6⅝	±1/32	1	¼"x45°	2	⅞
6⅝	5 x6 -4	7¾	±1/32	1	¼"x45°	2	⅞
8⅝	8 x8 -4	10	±1/32	1	¼"x45°	2	1¼

Friction type joint may be used (eliminating shoulders.)

*It is optional with the operator and manufac urer as to whether they will counterbore pin to a sufficient depth to get two circulation holes to discharge the water to the blade, or whether they will counterbore and weld in pipes for deflecting the circulating fluid to the blade.

Special Note: When ordering bits the length of blade should be specified. The width of the blade (plus or minus one-eighth inch) shall be its actual size before dressing, measured between parallel sides below the shoulder. Allowance must be made by the purchaser for the amount of clearance desired, keeping in mind that the inside diameter of pipe varies with its weight.

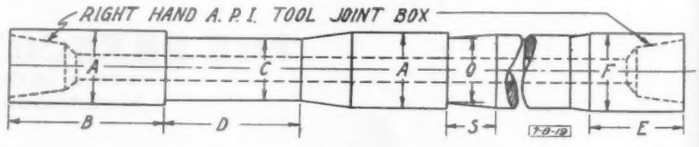


Figure 12.

Marking—Drill collars manufactured in accordance with these specifications shall be stamped with the size of the joint on both top and bottom box. The manufacturers' name or identifying mark, and the A.P.I. monogram shall be marked on the elevator recess, if used; if not, on the outside center.

For example, a drill collar for 6⅝-inch drill pipe with 5 by 6-4 connections should be marked as follows:

On top and bottom box: 6⅝
On elevator recess or outside center: 6⅝—A. B. Co.

Combination Drill Collars: Drill collars may be made with different sizes of boxes at each end. For example, a drill collar with 3 9/16 by 4⅝-5 upper box and 5 by 6-4 lower box should be stamped as follows:

Outside of upper box: 4½
Outside of lower box: 6⅝
Outside center: A. B. Co.

Unless otherwise specified, the dimensions "A," "B," "C," "D," "O," and "S" for combination drill collars shall be those given in Table 6, for the upper box, and dimensions "F" and "E" shall be those given for the lower box. For example, for a 4½-inch by 6⅝-inch combination drill collar, dimensions "A," "B," "C," "D," (and "O" and "S" when used), should be those given for the 4½-inch joint, whereas dimensions "F" and "E" should be those given for the 6⅝-inch joint.

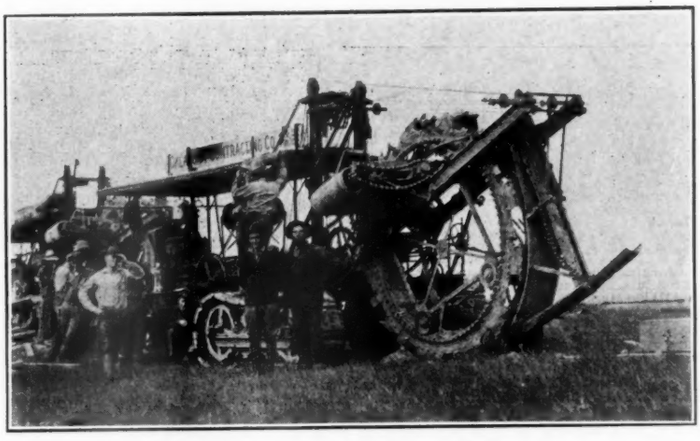
OKLAHOMA CONTRACTING COMPANY

WELDALINE COMPANY

Dallas
513 Thomas Bldg.
Tel. 7-3296-7

Tulsa
509 Kennedy Bldg.
Tel. 6591

PIPE LINE CONTRACTORS



We Are Equipped To Handle Any Size Job

We Specialize in Welded Lines

TABLE 6
A.P.I. STANDARD ROTARY DRILL COLLARS—MASTER DIMENSIONS ONLY
See Figure 12

All dimensions in inches at 68 degrees Fahrenheit. Taper joints shall be identified by the drill pipe size. Secondary recess not made on Drill Collars under 72 inches long.

Drill Pipe Size	Nominal Size of Joint	Top Box Diameter "A" Tol.	Top Box Length "B" Tol.	Elevator Recess Diameter "C"	Tol.	Elevator Recess Length "D" Tol.	Botton Box Length "E" Tol.	Bottom Box Diameter "F" Tol.	Secondary Overshot Diameter "O" Tol.	Secondary Overshot Length "S" Tol.
2⅜	1⅞x2⅝-5	3¼ ±1/32"	14±½"	2 7/16	+0 —1/32"	24±½"	14±½"	3¼ ±1/32"	2¾ ±1/32"	8±¼"
2⅞	2⅛x3 -5	3¾ ±1/32"	14±½"	2 13/16	+0 —1/32"	24±½"	14±½"	4⅛ ±1/32"	3¼ ±1/32"	8±¼"
3½	2 5/16x3½-5	4¼ ±1/32"	14±½"	3-19/32	+0 —1/32"	30±½"	14±½"	4⅝ ±1/32"	3¾ ±1/32"	8±¼"
4½	3 5/16x4⅝-5	5½ ±1/32"	16±½"	4-19/32	+0 —1/32"	36±½"	16±½"	6 ±1/32"	4¾ ±1/32"	8±¼"
5 5/16	4½x5½-4	6⅝ ±1/32"	16±½"	5⅝	+0 —1/32"	36±½"	16±½"	7⅛ ±1/32"	5⅞ ±1/32"	8±¼"
6⅝	5 x6 -4	7¾ ±1/32"	18±½"	6¾	+0 —1/32"	36±½"	18±½"	8¼ ±1/32"	7 ±1/32"	8±¼"
8⅝	7 x8 -4	10 ±1/32"	20±½"	8¾	+0	36±½"	20±½"	10½ ±1/32"	9 ±1/32"	10±¼"

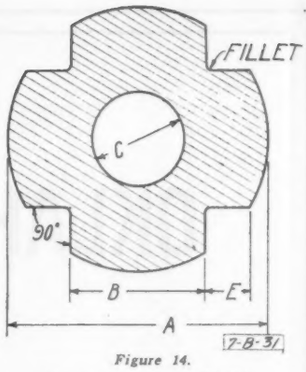


Figure 14.

TABLE 9
Couplings for Rotary Driving (Grief) Stems and Swivels
See Figure 13. All dimensions in inches at 68 degrees Fahrenheit. Taper joints shall be identified by the drill pipe size.

Size of Stem	Threads Connecting to Driving Stem and Swivel Stem	Size of Drill Pipe	O. D. All Couplings and Subs. "A"	Tol.	Swivel Coupling (Pin) and Upper Grief Stem Coupling (Box) Joint Left Hand	Length Over all "C"	Tol.	Lower Grief Stem Coupling Joint Pin R. H.	Length "C"	Tol.	Sub (Box and Pin) Joint Box and Pin R. H.	Length "C"	Tol.
2½" Square	Mfg's. Own Std.	2⅜	3¼	±1/32	1⅞x2⅝-5	9½	+⅛ —½	1⅞x2⅝-5	9½	+⅛ —½	1⅞x2⅝-5	9½	+⅛ —½
3" Square	Mfg's. Own Std.	2⅞	3¾	±1/32	2⅛x3 -5	10¼	+⅛ —½	2⅛x3 -5	10¼	+⅛ —½	2⅛x3 -5	10¼	+⅛ —½
3½" Square	Mfg's. Own Std.	3½	4¼	±1/32	2 5/16x3½-5	10⅞	+⅛ —½	2 5/16x3½-5	10⅞	+⅛ —½	2 5/16x3½-5	10⅞	+⅛ —½
4¼" Square	Mfg's. Own Std.	4½	5½	±1/32	3 5/16x4⅝-5	12⅛	+⅛ —½	3 5/16x4⅝-5	12⅛	+⅛ —½	3 5/16x4⅝-5	12⅛	+⅛ —½
5½" Fluted	Mfg's. Own Std.	4½	5½	±1/32	3 5/16x4⅝-5	12⅛	+⅛ —½	3 5/16x4⅝-5	12⅛	+⅛ —½	3 5/16x4⅝-5	12⅛	+⅛ —½
5¼" Square	Mfg's. Own Std.	4½	5½	±1/32	3 5/16x4⅝-5	12⅛	+⅛ —½	3 5/16x4⅝-5	12⅛	+⅛ —½	3 5/16x4⅝-5	12⅛	+⅛ —½
6" Square	Mfg's. Own Std.	6⅝	7¾	±1/32	5x6 4	14½	+⅛ —½	5x6 4	14½	+⅛ —½	5x6 4	14½	+⅛ —½
6½" Fluted	Mfg's. Own Std.	6⅝	7¾	±1/32	5x6 4	14½	+⅛ —¼	5x6 4	14½	+⅛ —½	5x6 4	14½	+⅛ —½
8" Square	Mfg's. Own Std.	8⅝	10	±1/32	7x8 -4	16¾	+⅛ —½	7x8 -4	16¾	+⅛ —½	7x8 -4	16¾	+⅛ —½

Threads on swivel coupling pin and upper coupling box to be left half. All other threads are right hand.

See Figure 13
All dimensions in inches at 68 degrees Fahrenheit except length of drill stem which is given in feet.

Size Square	Size Fluted	Threads, Top and Bottom of Stem	Diameter of Stem or (Width of Flat) "A"*	Length "B"	Min. Length Upper Neck Including Thread "D"
2½		Mfg.'s Own Std.	2½	28'-0"	18
3		Mfg.'s Own Std.	3	28'-0"	18
3½		Mfg.'s Own Std.	3½	33'-0"	18
4¼		Mfg.'s Own Std.	4¼	33'-0"	18
5¼		Mfg.'s Own Std.	5¼	33'-0"	18
	**5½	Mfg.'s Own Std.	5½	33'-0"	18
6		Mfg.'s Own Std.	6	33'-0" and 51'-0"	18
	**6½	Mfg.'s Own Std.	6½	33'-0"	18
8		Mfg.'s Own Std.	8	28'-0"	18

*Standard mill tolerance. **See Table 8.
All threads at bottom of stem to be right hand, at top of stem, left hand.
Grief stems, including both upper and lower couplings, are considered as one unit.

TABLE 8**
Section Details of Fluted Rotary Driving (Grief) Stems
See Figure 14
All dimensions in inches at 68 degrees Fahrenheit.

Nominal Size	"A"	"B"	"C"	"E"
5½	5.5	2.6250	2.25	1.1094
6½	6.5	3.3125	2.50	1.1250

Marking: Rotary driving stems manufactured in accordance with these specifications shall be stamped on the upper neck with size and length, manufacturer's name or identifying mark, and A.P.I. monogram.
For example: A 6-inch stem 33 feet long should be marked:
6" x 33'—A. B. Co.

Combination Subs

(See Figure 15)

Subs between the lower grief stem coupling and upper half of tool joint on drill stem may be made with different sizes of boxes or pins. The upper box may be smaller than the lower pin or vice versa. For example, a sub may be made with a 4½-inch upper box and 6⅝-inch lower pin, or with a 4½-inch upper box and a 3½-inch lower pin, or vice versa. When so made the body of the sub shall have the following dimensions (See Figure 10):

"X," Figure 15, shall be the same length as dimension "D," Figure 10, on the tool joint to which it connects.

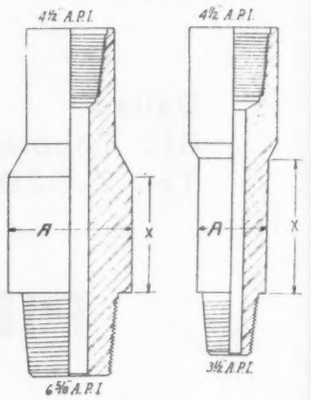


Figure 15.

"A," Figure 15, shall be the same diameter as dimension "A," Figure 10, of the tool joint to which it connects.

The size of the upper box shall be stamped on the outside of the box, and the size of the pin shall be stamped on the body.

Marking Couplings and Subs: All couplings and subs manufactured in accordance with these specifications shall be marked on the side with size of joint, right or left hand, manufacturer's name or identifying mark, and A.P.I. monogram.

For example: An upper coupling for a 6-inch grief stem should be marked as follows:

6-5/8 L. H.—A. B. Co.

A lower coupling pin for a 6-inch grief stem should be marked as follows:

6-5/8 R. H.—A. B. Co.

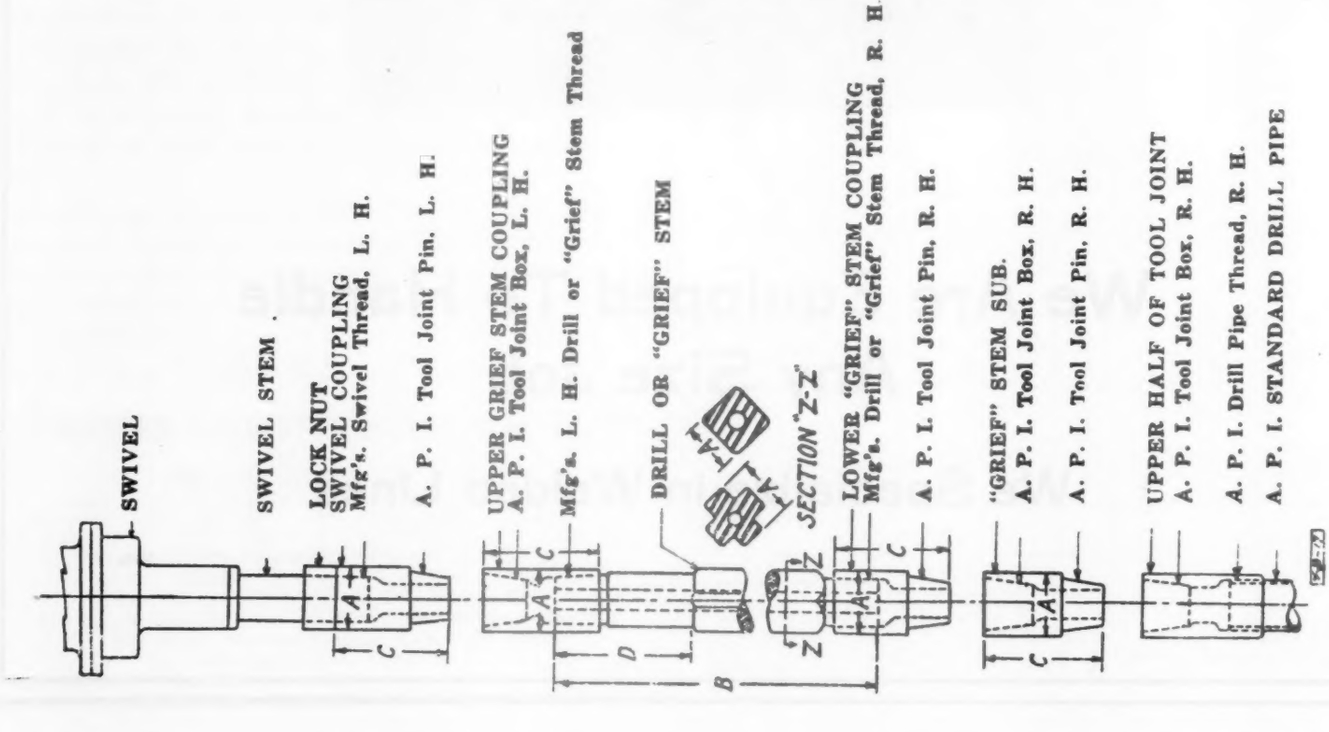

SWIVEL
SWIVEL STEM
LOCK NUT
SWIVEL COUPLING
Mfg's. Swivel Thread, L. H.
A. P. I. Tool Joint Pin. L. H.
UPPER GRIEF STEM COUPLING
A. P. I. Tool Joint Box, L. H.
Mfg's. L. H. Drill or "Grief" Stem Thread
DRILL OR "GRIEF" STEM
SECTION "Z-Z"
LOWER "GRIEF" STEM COUPLING
Mfg's. Drill or "Grief" Stem Thread, R. H.
A. P. I. Tool Joint Pin, R. H.
"GRIEF" STEM SUB.
A. P. I. Tool Joint Box, R. H.
A. P. I. Tool Joint Pin, R. H.
UPPER HALF OF TOOL JOINT
A. P. I. Tool Joint Box, R. H.
A. P. I. Drill Pipe Thread, R. H.
A. P. I. STANDARD DRILL PIPE
A
C
D
B
Z
Z

Figure 13—Driving "grief" stems.

The way to fight pipe line corrosion

COAT the pipe with Johns-Manville Asphalt Cement, seal on a protecting envelope of Johns-Manville Asbestos Pipe Line Felt, then a final coat of Johns-Manville Asphalt Cement outside—and the job is done to stay. The result is a rot-proof armor, approximately 1/4" thick, tightly sealed against the pipe, without air spaces. This is real protection, by far the most economical.

JOHNS-MANVILLE

Oil Industry Department

JOHNS-MANVILLE CORPORATION, Madison Avenue at 41st St., New York. Branches in All Large Cities. For Canada: CANADIAN JOHNS-MANVILLE CO., LTD., Toronto

A. P. I. SPECIFICATIONS ON MISCELLANEOUS ROTARY STANDARDS

Recommended Practice on Methods of Measurements, Etc.

Material Covered

These recommendations apply to the following materials:

(a) Measurement of sheaves and hoisting blocks.

(b) Measurement of double swivel drilling hooks.

(c) Standard taper for rotary master bushings or spiders.

The recommendations contained herein

R. A. GRIFFITH
Rotary Drilling Equipment.

are dimensional only and apply to new material and do not include either chemical or physical properties of materials.

Marking

No authority will be granted to use the A.P.I. monogram on any of the materials

CLAUDE M. MURRAY
Rotary Drilling Equipment.

described in this specification. This specification covers recommended practice only. Reference to this specification may be made by manufacturer when describing any materials manufactured in accordance with these recommendations.

Measurement of Sheaves and Hoisting Blocks

All sheaves and rope pulleys shall be measured from the bottom of the groove, as per "A" in Figure 1.

The size of hoisting or traveling blocks shall be determined by the length of the side bar or "B" in Figure 1.

The form of groove in rope pulleys and sheaves shall be as stipulated in the A.P.I. specifications for wire rope and manila cordage. (See A.P.I. standards

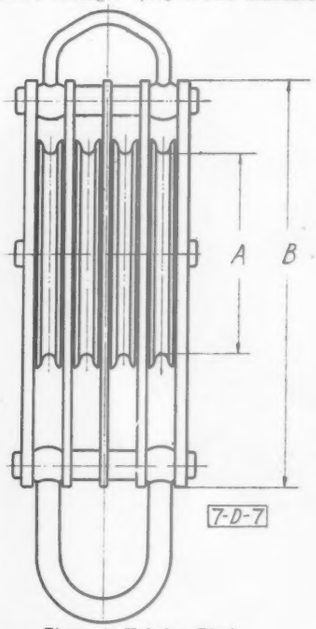


Figure 1—Hoisting Blocks.

No. 9-A: "wire rope" and A.P.I. standards No. 9-B: "manila cordage.")

Measurement of Double Swivel Drilling Hooks

Double swivel drilling hooks shall be of forged steel and the size shall be determined by the diameter of the shank immediately below the cross-head, as per "A" in Figure 2, and shall be in variations of not less than one-half inch. The size of the hook, as well as the manufacturer's name or other identifying

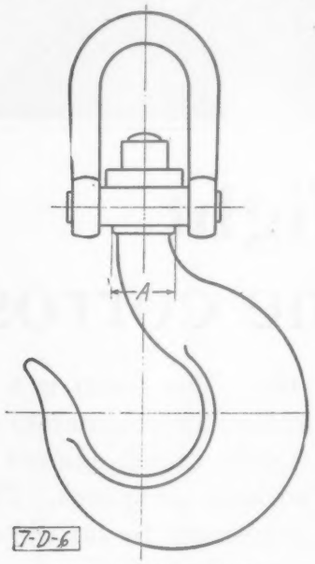


Figure 2—Drilling Hooks.

marks, shall be stamped with a steel stencil on the flattened section of the hook. Stamping the hook with its rated capacity with a factor of safety is optional with the manufacturer.

Recommended Standard Taper for Spiders or Master Bushings in Rotary Drilling Machines

The recommended standard taper for spiders or master bushings in rotary machines is 4 inches per foot (1 in 3) measured on the diameter, as per the angle "A" of Figure 3, or 2 inches per foot, (1 in 6) measured to the axis of the bushing.

Due to the special features of different designs of rotaries now in use (some of them patented), it was considered inadvisable at this time to give the major diameter.

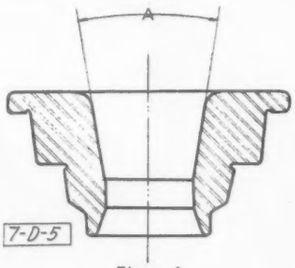


Figure 3.

Miscellaneous

It is recommended that the A.P.I. standard form of groove be used on all

H. M. STAGG
Rotary Drilling Equipment.

sheaves in crown blocks, or any other equipment involving the use of sheaves

T. B. CRANFILL
Rotary Drilling Equipment.

not specifically mentioned herein. See A.P.I. standards No. 9-A: "wire rope" and A.P.I. standards No. 9-B' "manila cordage."

SECTION 4—BOTTOM DESIGN

(4-a) All rectangular bottom plates shall be one-fourth-inch thick, 72 inches wide, and shall have the same approximate lengths as one-fourth-inch shell plates.

(4-b) Bottom sketch plates in tanks over 48 feet in diameter shall be five sixteenths-inch thick and 72 inches wide. Sketch plates in tanks 48 feet in diameter and less shall be one-fourth-inch thick and 72 inches wide.

(4-c) Bottom rivets shall be five-eighths-inch in diameter and shall be driven hot with steeple heads.

Explanation of Changes from Specification of January, 1927

1. Since strain gauge tests have not yet conclusively ind cated point at which stress should be figured, and since several district subcommittee favored a more conservative plan than figuring stress at center of ring, it was decided to return to the original recommendation and figure stress 12 inches above bottom.

R. E. WERTZ
Steel Storage.

2. Limitation of 35,000 pounds maximum bearing to joints where rivets are in double shear, and adoption of lower

H. A. FITZSIMMONS
Rotary Drilling Equipment.

maximum for joints with rivets in single shear, based on practice of American Institute of Steel Construction.

3. Adoption of definite plate sizes (now paragraph 2-d) based on manufacturers' recommendation that size indicated will give most economical tank

SPECIFICATIONS FOR STEEL STORAGE TANKS

(Continued from Page 172)

rafters to each shell plate; spacing on inner rows is not to be greater than 5½ feet.

COME

to Booth No. 5

Texas Building

You can see for yourself why the largest users of Swabs in America are laying aside their old equipment and Standardizing on

The

Burt

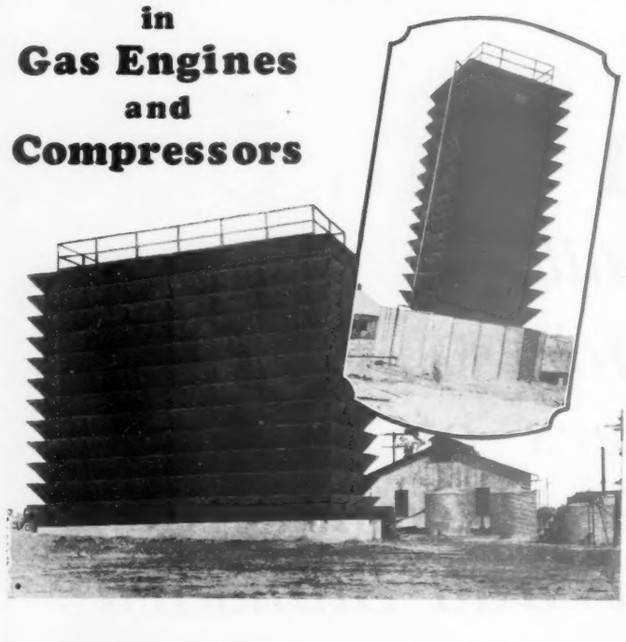
Swab

We have inside information for you. We have no yearly models. The parts that went on Swab No. 1 will fit on No. 1000 or No. 1500. Henry Ford is the only one that beat this record.

Mfg. by **THE BURT CORP.**

316 S. Frankfort - - - - - - Tulsa, Okla.

PROTECT
YOUR INVESTMENT
in
Gas Engines
and
Compressors



FLUOR COOLING TOWERS

with atmospheric self-scaling admiralty coils will assure you a continuous supply of *clean cold* water at low expense and practically no upkeep.

Our engineers in Tulsa and Los Angeles are thoroughly experienced and equipped to make recommendations.

Jackson Engineering & Equipment Company

909 East 59th St., Los Angeles, Calif.

502 National Bank of Commerce Bldg. Tulsa, Okla.

FLUOR
REDWOOD
COOLING TOWERS

Minimum thicknesses (new paragraph 2-e) and arrangement of rings, new paragraph 2-f) adopted as most desirable arrangements.

4. Paragraphs 2-g, -h, and -j replaces paragraphs 2-d, -e, -f and -g, in specification of January, 1927.

Largest tanks indicated in table of sizes under paragraph 2-d will call for plates heavier than originally contemplated. To insure high quality workmanship on these heavy plates, drilling or sub-punching and reaming of holes is specified in 2-g for plates thicker than five-eighths-inch. The wording of the last part of the paragraph has been made more specific.

5. Bevel shearing or planing has been optional on plates over one-half-inch thick, in view of agreement that split-caulking can be satisfactorily done on such plates.

6. Paragraph 2-j re-words paragraphs 2-e to -f of January, 1927 specifications, making the intent clearer and more specific.

7. Paragraph 2-k is the same as paragraph 2-h in specifications of January, 1927.

8. Paragraph 2-m replaces Paragraphs 2-i, -j, and -k of specifications of January, 1927—the change being a substitution of A. S. M. E. Boiler Code rules regarding back-pitch, for the special rules in the first draft.

9. Paragraph 2-n was added, mainly to guide those who prepare detailed designs for tanks of different sizes.

10. Paragraph 2-p replaces paragraph 2-1 of the January, 1927 specifications. Button heads have been omitted since, in the opinion of the committee they are not a satisfactory tank rivet. Snap dimensions shown conform to those in general use.

11. Paragraph 2-q was inserted at the suggestion of several district sub-committees.

12. Paragraph 2-r was inserted simply to provide definite instructions for bottom-angle caulking.

13. Structural shapes specified for roof supports because in opinion of committee they are more economical and facilitate attachment of girders, and cleaning.

14. Thickness and dimensions of roof plates definitely specified.

15. As the length of shell plate was increased, the form of specifying rafter spacing was changed to keep the spacing of the inner rows the same as originally specified.

16. Section on bottom design added to definitely cover points of design not previously decided upon.

STANDARD SPECIFICATIONS FOR A.P.I. BOLTED TANKS

Dimensions				Shell				Bottom		W.S. Roof		Cone Roof	
Nominal Capacity	Actual Capacity	Diameter in Feet and Inches	Height in Feet and Inches	No. of Staves per Ring	U.S.S. Gauge	No. of Rows of Bolts	Size of Bolts in Inches	U.S.S. Gauge	Size of Bolts	U.S.S. Gauge	Size of Bolts	U.S.S. Gauge	Size of Bolts
100	95.8	9 2⅝	8 0⅓	6	14	1	⅝	14	⅝	14	⅝	14	⅝
					14	1	⅝						
200	191.6	9 2⅝	16 1	6	14	1	⅝	14	⅝	14	⅝	14	⅝
250	266.2	15 4½	8 0⅓	10	12	1	½	12	½	12	½	12	½
					12	1	½						
500	532.4	15 4½	16 1	10	12	1	½	12	½	12	½	12	½
500	.....	21 6	8 0⅛	14	12	1	½	12	½	12	½	12	½
					12	1	½						
1000	.....	21 6	16 1	14	12	1	½	12	½	12	½	12	½
1000	992.8	29 8½	8 0⅓	20	12	2	½	12	½	12	½	12	½
					12	2	½						
2000	1985.6	29 8½	16 1	20	12	2	½	12	½	12	½	12	½
					12	2	½						
5000	5034.0	38 7½	24 1⅓	26	10	2	½	10	½	12	½	12	½
					10	2	½						
					10	2	½						
10000	.....	55	24 1⅓	37	10	2	½	10	½	12	½	12	½
					3/16	2	½						

All bolts to have 2-inch pitch with 2-inch between rows center to center. Double bolted seams to be square patterns. Water seal roofs to be figured for 9 inches of water. Cone roofs to have a pitch of 1 inch in 12 inches. Standard sheets to be 60 inches by 100 inches.

A. P. I. SPECIFICATIONS FOR RIGS AND DERRICKS

(Continued from Page 136-K)

rick corner foundation opposite the calf wheel leg in order to distribute the load on the derrick.

5-f. Stand Pipe Location: The stand of pipe of a rotary rig should be attached to the derrick leg rather than to the girts for often the rotary swivel binds in such a manner as to cause the hose to warp around the kelley stem, in which case, if the stand pipe is attached to the girts great danger is encountered by the pulling in of that side of the derrick and quite possibly causing failure of the derrick, whereas if the stand pipe is attached to the derrick leg itself sufficient resistance would probably be offered to cause the hose to break before damage is done to the derrick. Furthermore, the derrick leg is better able to withstand the vibrations of the stand pipe.

5-g. Dead Line Anchors. The dead end of a line never should be attached to any part of the derrick structure, but instead anchored to the foundation in order to obtain the benefit of the weight of the foundation. The attaching of dead lines to grits or braces of a manufactured derrick is almost sure to cause trouble sooner or later.

5-h. Corrosion and Decay: The ill effect of corrosion to steel and decay to wood are well known throughout the industry but frequently the cost of the damage they do is not realized. Proper protection against these ravaging elements is always a good investment.

Standard Rig and Equipment Housing

6. All building dimensions hereinafter given are recommended by the committee as tentative specifications with the hope that these equipment houses can eventually be standardized.

6-a. Standard Rig Gas Engine House: 18 feet by 18 feet. Tolerance plus or minus 3 inches. Wall height 8 feet. Tolerance plus or minus 2 inches. One window located in each side of engine house with minimum glass area of 6 feet, set at a minimum height of 3 feet above floor, with a single door located on the derrick side not less than 2 feet, 8 inches by 6 feet, 8 inches, nor more than 3 feet. by 7 feet. A belt tunnel opening not less than 7 feet wide by 8 feet high. tolerance in height of minus 1 foot. A single or double door with an overall width of 7 feet by 8 feet high in the wall opposite the derrick side.

6-b. Belt Tunnel: The belt tunnel shall be 7 feet wide.

6-c. Band Wheel House: The band wheel house shall be 9 feet wide and of sufficient length to cover machinery and of sufficient height to give a minimum clearance of 8 feet over a 12-foot band wheel.

6-d. Rotary Draw Works Engine House: The rotary draw works engine house shall be 23 feet wide by 17 feet deep, tolerance plus 6 inches, minus 0 inch with a minimum wall height of 8 feet.

6-e. Standard Rotary Draw Works Engine House: The standard rotary draw works engine house for electric drilling shall be 23 feet wide by 24 feet deep, tolerance plus 6 inches, minus 0 inch and with a minimum wall height of 8 feet from either the derrick floor or this engine house floor.

6-f. Rotary Slush Pump House: The

rotary slush pump house shall be 23 feet wide by 8 feet deep, tolerance plus 6 inches, minus 0 inch with a minimum wall height of 8 feet above the floor of the house. This house shall be provided with a suitably located door in the side opposite the derrick which shall be 6 feet wide and a minimum of 7 feet high.

6-g. Bull Wheel House: The bull wheel house shall have a base dimension of 17 feet wide by 5 feet deep, tolerance plus 6 inches, minus 0 inch with a minimum height of 8 feet and so constructed as to be located with one end practically adjacent to the derrick corner adjacent to the bull wheel tug rim.

Specifications for Concrete Derrick Foundation

7-a. The following is submitted as a type of specification suitable for the construction of concrete derrick corners and other structures about an oil well where conditions are such that any refinement of methods is practically impossible. This specification should not be used for any other class of work.

Materials

7-b. Portland Cement: The cement shall be new and free from lumps. The foreman shall promptly reject any cement that has hardened or partially set, and shall protect all cement delivered on the site by storing it in a shed if possible, or by covering it with paulins until it is ready to be used. Cement shall not be piled on the ground, but shall be neatly stacked on a platform held at least 6 inches from the earth. Any cement that is rained upon or otherwise subjected to dampness shall not be used.

7-c. Aggregates: The sand and stone shall be clean and free from lumps of earth or other foreign matter, and the particles shall not be coated with mud, oil, or any other injurious substance. The sand shall not be composed of uniform size grains, but shall contain both fine and coarse particles, the coarse predominating. The stone or gravel should be of different sizes, varying from one-quarter of an inch as the smallest, to particles that will pass in any direction through a 2-inch circular opening, as the largest.

7-d. The foreman shall see that the stone and sand are stored in separate piles, and protected from the addition of foreign substances.

7-e. Locally dug gravel or stone shall not be used except upon written permission of the oil company's engineer and shall not be used in any way other than he may specify.

7-f. Mixing Water. Mixing water shall be free from oil, acid and injurious amounts of vegetable matter or salts. In general, if the water is unfit for drinking, it is unfit for concrete. The foreman shall see that the best water available at the site is used.

Proportioning and Mixing

7-g. General: The unit of measure shall be the cubic foot. One sack of cement (94 pounds) is assumed as 1 cubic foot. The foreman shall provide a wooden box whose inside dimensions shall be exactly 12 inches square and 12 inches deep made with a bottom, if concrete is mechanically mixed, and without a bottom, if mixed by hand. The box shall have suitable handles for convenience in lifting.

7-h. If concrete is to be mixed by hand, the foreman shall provide a water-tight mixing platform at least 7 feet wide and 12 feet long. He shall also provide a can of known gallon capacity for measuring the mixing water.

7-i Measuring Ingredients: All ingredients shall be accurately measured to secure the specified proportions in each batch. The stone and sand must be measured separately. The water shall be so measured as to insure the specified quantity in each batch.

7-j. Hand Mixing: In case concrete is hand mixed, it shall be done in the following manner and order. The measured quantity of sand is to be spread out evenly on the platform. On this is evenly spread the required amount of cement. The cement and sand are then turned over thoroughly with square shovels, enough times to produce a mass of uniform color. The measured quantity of broken stone or gravel is then spread in a layer on top of the cement-sand mixture, and all the materials again mixed by turning with shovels until the stone has been uniformly distributed throughout the mass. A depression or hollow is then formed in the center of the pile and the measured water added slowly while the materials are turned, this turning being continued until the whole mass is in a plastic or pasty-jelly-like consistency.

7-k. Machine Mixing: If a mechanical mixer is used, the measured ingredients are to be placed in the mixer, and mixed for not less than two minutes.

Proportioning

7-l. The proportions of materials for concrete going into derrick corner foundations, shall be based on the requirements for a workable mix, containing in any case, not more than 7 gallons of water per sack of cement. In case the sand is very wet, as right after a rain, the water must be cut to 6 gallons per sack of cement. If the sand is uniformly damp, 6½ gallons of water will be used per sack of cement. The other ingredients shall be proportioned as follows:

1 sack of Portland cement
2 cubic feet of sand
3½ cubic feet of gravel or stone.

The mixture shall be such as to produce concrete that can be worked readily into the corners and angles of the forms with ordinary spading. The workability will be controlled by adding or deducting sand or stone, but in no case shall the amount of stone be such as to produce harshness in placing or honeycombing in the structure. Most important of all, the amount of water specified for each sack of cement shall in no case be exceeded.

7-m. Handling and Placing: Concrete shall be placed in the forms in such a manner as to prevent the separation or loss of ingredients. Each batch as placed shall be well spaded into the corners of the form so as to eliminate air pockets and prevent honeycombing. Concrete must be placed in the forms immediately after being mixed, and under no circumstances shall concrete that has partially hardened be deposited in the forms.

7-n. Admixtures: Calcium chloride or other admixtures shall not be added to the concrete except upon written order of the oil company's engineer, and then, only in the proportions specified by him. If admixtures in liquid form are ordered, the quantity used must be deducted from the mixing water.

IMPORTANCE OF UNIFORM GAUGING PRACTICE

(Continued from Page 136-L)

variation of four threads possible in the product from maximum pipe in minimum coupling, to minimum pipe in maximum coupling. Suppose now that between two manufacturers a difference in the use of the gauges resulted in a difference of two threads in their respective positions for ideal gauge fit. The resultant variation of fit when their products were interchanged would be as a maximum six threads or a 50 per cent increase over the amount which has been selected as a maximum allowance.

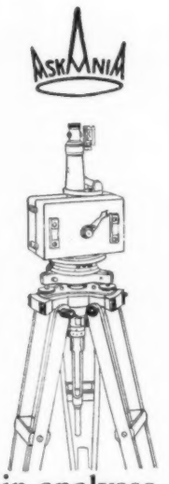
To avoid such a condition, prints illustrating gaging practice have been provided showing just how the gauge is to be applied to the work, and in addition a method has been devised for enabling all manufacturers to screw up a gauge of a certain size to a uniform degree of tightness when making working gauges from their masters. The device by which this result is accomplished consists of a specified weight dropping a predetermined distance against the end of a standard lever attached to the gauge, the proportions varying somewhat with gauges of different sizes. The arrangement of the "torque hammer" is illustrated in Figure 4. This insures a very close correspondence of the ideal gauging point and reduces the spread to be expected between minimum and maximum fits produced in different localities.

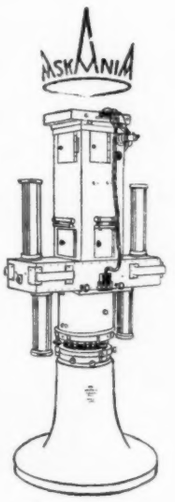
Figure 5 illustrates the sheet on gauging practice for drill pipe threads and requires no special comment, except to

(Continued on Page 324)

Eliminate Guesswork— Use Askania Geophysical Instruments

More than ever before the petroleum geologist depends on quick and reliable information about the subsurface conditions, especially in unexplored areas with little or no surface indications. Our torsion balances and magnetometers have greatly assisted geologists of many leading American operating companies in their exploration work. They have proved the test of time and accuracy of their analyses.





For economical exploration use our geophysical instruments.

We are making and selling for geophysical work: Torsion Balances, large and small model, with automatic recording and visual reading; magnetometers; earth inductors.

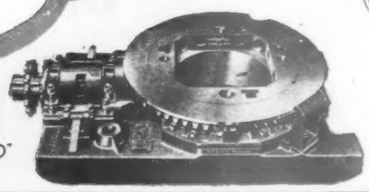
We train your personnel without charge.

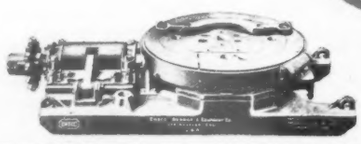
Write for bulletins.

Askania Werke A. G.

American Office
1024 Keystone Building,
HOUSTON, TEXAS

EMSCO
A Complete Line of Better Oil Well Equipment


Type "D"


Type "C"

Emsco Standard Types of

A Type For Every Operating Condition

EMSCO Type "D" Roller Bearing All-Steel Rotary Machine. (25½-inch opening.) Designed for drilling to extreme depths and to withstand the most severe service and abuse; one piece base with skids cast integral; unitary bearing housing (gives perfect alignment); oversize Timken roller bearings; solid hub driving sprocket; large cone rollers (drop forged alloy steel, hardened and ground) in table bearings; safety guard for gear ring; minimum height; hold down bracket completely around table. This design allows additional needed space on derrick floor.

Emsco Type "C" Roller Bearing All-Steel Rotary Machine. (20-inch opening.) The same in design and construction as our Type "D" rotary except that it has a 20-inch opening. Recommended for any condition where a 20-inch rotary machine is required, and for the deepest holes.

Emsco Type "EA" Roller Bearing Rotary Machine. (20-inch opening.) Embodies the paramount Emsco features, but designed to be used exclusively with Emsco Types "S" and "SH" Draw Works.

Emsco Type "R" Draw Works. (3-speed.) The strongest type of rotary hoisting apparatus ever developed. Recommended for the deepest wells and the hardest service. Embodies many new and important improvements, such as unitary assembly of double brake lever and equalizer adjusting mechanism, countershaft drive between posts two and three; press forged non-bursting brake rim; and Emsco solid woven brake blocks 1 inch thick.

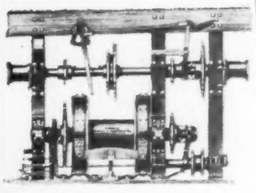
Emsco Type "RL" Draw Works. (3-speed.) Identical with the Emsco Type "R" except that it is lighter and recommended for depths not to exceed 5,000 feet.

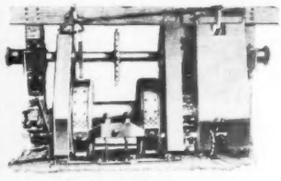
Emsco Type "Q" Draw Works. (3-speed.) Designed to meet the demand for light but sturdy apparatus for drilling to depths up to 4,500 feet. Embodies the same advantages and practically all the improved features of our type "R" equipment.

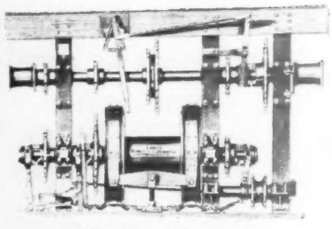
Emsco Type "Q" Draw Works. (2-speed.) Exactly the same as our type "Q" described above, except in number of speeds.

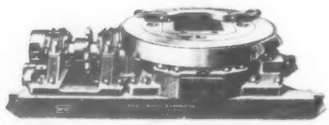
Emsco Type "S" Draw Works. (2-speed.) Designed especially for Emsco Portable Drilling Machines, for depths up to 3,000 feet. Light in weight but exceptionally strong. Embodies many of the improved features and advantages of our standard Type "R" equipment. Can also be used on any type of derrick. Designed to be used exclusively with Emsco Type "EA" Rotary Machine.

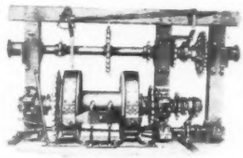
Emsco Type "SH" Draw Works. (2-speed.) Same as our Type "S" equipment except that it is heavier and recommended for depths up to 3,500 feet. Designed to be used exclusively with Emsco Type "EA" Rotary Machine.

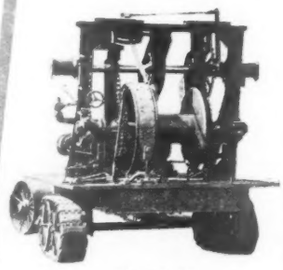

Type "Q" 2 Speed

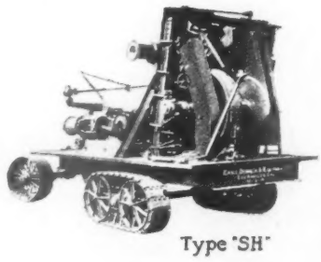

Type "RL"


Type "Q" 3 Speed


Type "EA"


Type "R"


Type "S"


Type "SH"

EMSCO STEEL EQUIPPED WELLS ARE SAFE

EMSCO
A Complete Line of Better Oil Well Equipment

Rotaries and Draw Works

EMSCO standard types of Rotaries and Draw Works represent the combined experience, extending over a period of nearly a score of years, of a group of men that is now the most outstanding organization of oil field engineers and manufacturers in all the world.

During the past five years this organization has given to the Petroleum Industry more advancements and improvements in oil country equipment than in all previous petroleum history, among the most prominent of these products being rotaries and draw works for rotary drilling.

The present standardized *line of Emsco All-Steel Rotaries and Draw Works is without a peer in range of service, as well as in quality, modern design, improved efficiency, and performance; embracing all the modern developments of our engineering and manufacturing experience; and their great superiority is due in a large measure to a process of selection and elimination.

There is an Emsco Rotary and Draw Works for every condition encountered in oil country work. Tell us your conditions and requirements and we will promptly send you complete data, drawings and specifications of the equipment designed especially for that service.

*Due to many requests for equipment for special purposes, and our desire at all times to assist operators with the various problems confronting them, we have developed a large number of different types and sizes of rotaries and draw works, each of which is functioning properly for the service intended. The large number of types represented, however, has necessitated designating some of these as "Special." Emsco Standard Rotaries and Draw Works are those which are designed and built for conditions prevailing in practically all fields, in which the service varies only in slight degree; and are the result of our process of elimination among all types previously built to obtain the best for the specific service involved.

EMSCO
Derrick & Equipment Company
Los Angeles California
Houston Texas
New York Office 150 Broadway

EMSCO STEEL EQUIPPED WELLS ARE SAFE

Booth 34

Mason Regulators for Oil Field Service will be on display in Booth 34 at the International Petroleum Exposition.

You are cordially invited to inspect them and we shall be glad to explain their application.

Our representatives, the Atlas Supply Company, are co-operating with Mr. Frank Morrison, Sales Manager of the Mason Regulator Co., who will be in charge of the booth.

* * * * *

Mason Regulators Include:

Casing Head Gas Regulators for back pressure relief or for regulating the amount of vacuum in a vacuum system.

Liquid Level Controllers for maintaining the desired level in stills, absorber towers, receivers, etc.

Gas Burner Regulators for gas pressures up to 250 pounds.

Reducing Valves for oil, gas, water, air.

Pump Speed Governors for controlling direct acting steam pumps or process work, booster lines, etc.

Balanced Valves, rotary shaft type.

Pipe Line Strainers.

Mason Regulators

MASON REGULATOR CO.
Boston, Mass.

Muskogee, Okla.
Atlas Supply Co.

Los Angeles, Calif.
Warren & Bailey Co.

Houston, Texas
J. A. Rossiter Co.

A.P.I. SPECIFICATIONS FOR OIL FIELD BELTING

(Continued from Page 187)

or elsewhere, within six months after receipt of the goods by the consumer.

G-11-b. Samples of rejected belting shall be preserved for 30 days from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

G-11-c. Any length of belting which fails to meet the requirements of these specifications may be rejected.

SECTION H

Recommendations for Care and Use of Oil Field Belting

H-1. Keep belts tightly rolled until ready to apply.

H-2. Always use a square in cutting belts and in laying out bolt holes.

H-3. Use a very small punch or drift pin in making holes in a hair or fabric belt. For rubber, solid woven cotton, leather, stitched cotton and balata belts use a punch one-sixteenth-inch smaller than the bolt.

H-4. Inspect clamp bolts frequently and keep them tight.

H-5. When using belt clamps with filler, replace the filler when it becomes sufficiently worn for the belt to start wearing at the clamps.

H-6. Keep faces of pulleys and bandwheels free from dirt and other foreign material.

H-7. Do not allow water, tar, lubricating oil, grease or cement to get on belt or pulleys.

H-8. Do not use melted inner tubes, stick dressing, paraffin or other similar materials for belt dressing.

H-9. If belt dressing recommended by the manufacturer is not available, use only vegetable castor oil on belts other than leather, and then only at such time as it becomes absolutely necessary. Use this material very sparingly on hair and fabric belts and only on rubber and balata belts at such times as they have a tendency to slip.

H-10. Use neatsfoot oil for belt dressing on leather belts and apply it on the outside of the belts.

H-11. Do not run the lap in a leather or step-spliced belt against the pulley.

H-12. Keep the pulleys in alignment.

H-13. Keep all of the belt on the pulleys.

H-14. Do not permit belt to rub on engine sill, sand reel sill, belt house roof, or any other part of the belt house.

H-15. Run the belt as loose as possible without slipping.

H-16. On bandwheel powers release the tension on the belt at the idler when the power is shut down.

H-17. Use properly heat treated steel bolts for clamps.

H-18. Horsepower transmitted (See manufacturers' tables).

H-19. Store all belts in as cool a place as possible.

H-20. If possible, use belt stretchers in applying the belts to the pulleys. If belt stretchers are not available, use soft rope.

H-21. Keep the belt house as near weather tight as possible and properly drained. It is also recommended that the belt house be floored.

H-22. Keep an accurate belt record.

SELECTING SUCKER RODS BIG PROBLEM

(Continued from Page 137)

pin or in the rod just back of the upset, and so is responsible for a majority of rod failures. A joint may be mechanically defective, or under strength in fatigue in result of any number of causes, but the concern of the user who is selecting sucker rods is merely whether or not it is deficient in comparison with others, and he is not to be expected to inquire why.

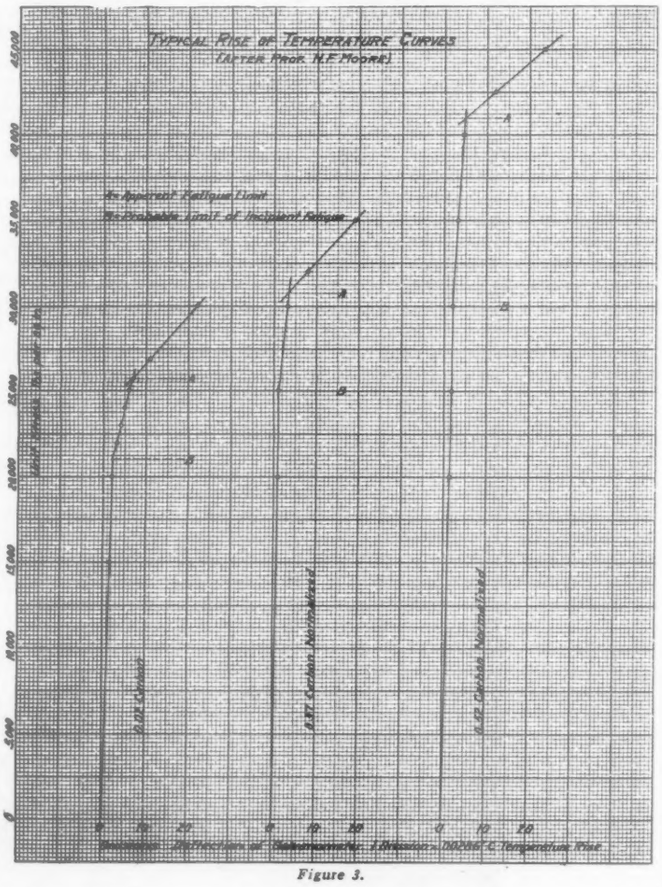
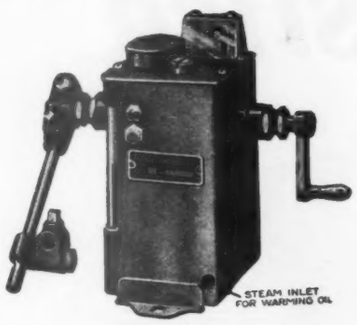


Figure 3.

The testing machine illustrated in Figure 2 was perfected by the Texas Steel Co. and has been used extensively in testing rods of all makes for some time. Coupling boxes are made up on each end of a double pin pony rod (with other pins inserted in outer end of each coupling) and the couplings are then inserted and tightened in the two sockets of the machine. These sockets hold the cou-

"MANZEL"
FORCE FEED LUBRICATORS
For Every Oil Field Service

MODEL XD
For Steam Engines and Pumps Air and Gas Compressors, Etc.



In every important oil field you will find "Manzel" Model "XD" Force Feed Lubricators lubricating the great majority of the engines, pumps and compressors, and doing the job most efficiently, too.

Simple in design, easy to operate and positive always, they have everywhere won the approval of operators who have learned through actual experience of their unfailing reliability under the exacting requirements of oil field service.

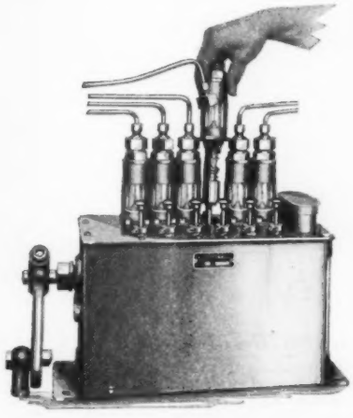
Being entirely automatic in action, they require no attention, but start, stop, speed up and slow down with the engine, always supplying the exact amount of oil needed—no more and no less.

"Manzel" Model "XD" lubricators save enough oil in a short time to pay for themselves, but what is even more important, they save the engine cylinders, prevent costly shut-downs due to lubrication troubles, and eliminate repair bills.

MODEL "82"
For Timed Lubrication of Diesel Engines

This model has been designed especially for Diesel Engine use and will deliver the oil directly onto the piston between the rings, at the end of the working stroke, or any other pre-determined time or place.

By proper timing of the delivery of oil into the cylinders, the efficiency of your engines will be greatly increased; wear on the pistons and cylinders reduced to a minimum; and carbon trouble, due to excess use of cylinder oil, eliminated.



CLASS "XW"
For Oil and Gas Engines

For lubricating the bearings, as well as the cylinders of all kinds of oil field gas and oil engines.

Measure out the oil to each point just as it is needed without wasting a drop. After being adjusted to meet the needs of the engine, require no further attention, except to keep the reservoir supplied with oil.

Easily installed on all makes of engines.

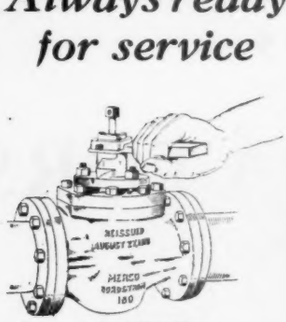
Complete fittings for installing can be furnished, if desired, for most of the different types of engines used in the oil fields.

Dont fail to see our interesting working exhibit of "Manzel" Lubricators at the International Petroleum Exposition, Booth 51, Oklahoma Building.

May we send you our complete catalog?

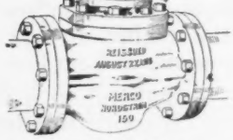
Manzel Brothers Company
336-338 Babcock Street **Buffalo, N. Y.**

Always ready for service



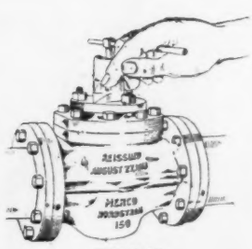
IF STUCK

If, after long disuse, the Valve seems stuck, it requires no drastic wrenching.



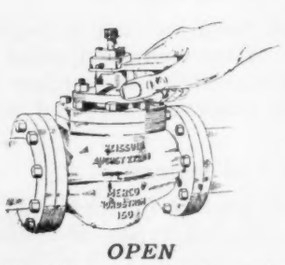
GREASED

A stick of special Merco lubricant is inserted.



TURN LUBRICATING SCREW

Hydraulic pressure of up to 2000 pounds per square inch is exerted upon the plug, by merely turning the screw.

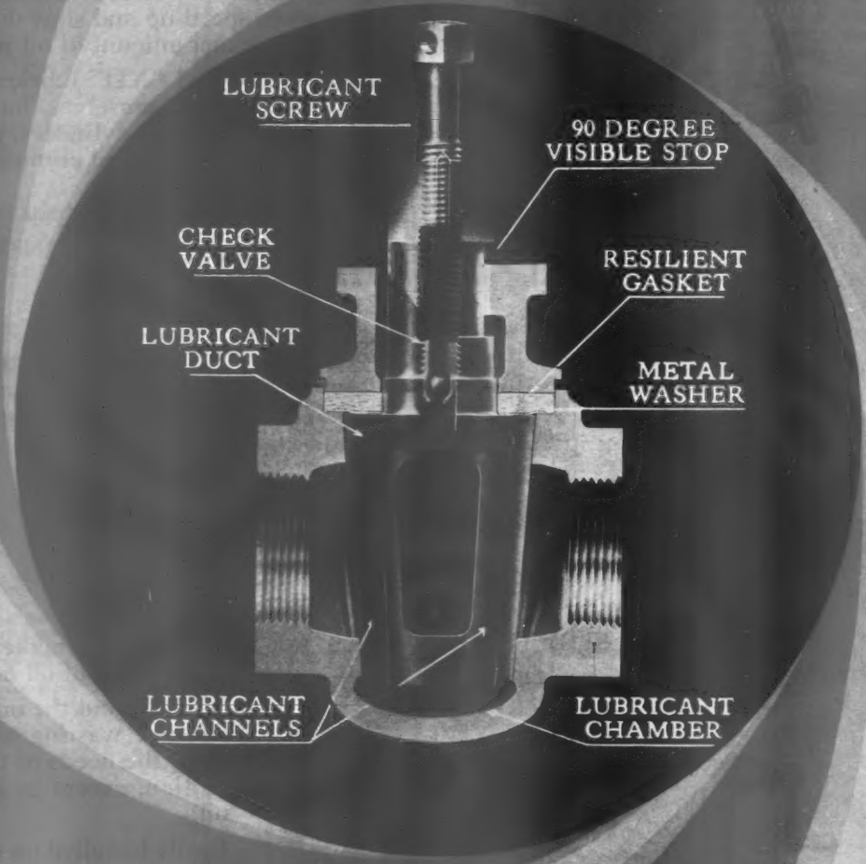


OPEN

The Valve can then be easily opened or closed, without exertion.

Merco Engineers have compounded special Merco Lubricant in stick form, in different consistencies to meet various conditions of temperature, pressure and content of lines.

Merco Nordstrom PLUG VALVES *won't leak* AND *won't stick*



It is unnecessary to open and close these Valves frequently to prevent sticking. The lubricant covers the entire surface of the plug and a slight turn of the lubricant screw adds hydraulic pressure whenever desired. Eminently satisfactory for service in the Petroleum Industry—refineries, gas lines, acid lines, gasoline plants, etc.

Just off the press—a special pamphlet written for Petroleum Engineers. Ask for a copy!

MERCO NORDSTROM VALVE CO.

SUBSIDIARY OF THE MERCOID CORPORATION

Engineers— San Francisco, 121 Second St.; Chicago, Peoples Gas Building; Cleveland, Ohio, 325 Engineers Building; Western Factory: Oakland, California

Manufacturers New York, 11 W. 42nd St.; Houston, 1115 Petroleum Bldg.; New Orleans, 1501 Masonic Temple Bldg.; Eastern Factory: Belleville, New Jersey

AGENCIES IN PRINCIPAL CITIES

plings and rod in perfect alignment and permit of no "wobbling" of the couplings.

The machine is then started in motion; one coupling remaining stationary while the other is forced toward it a measured distance, thus flexing the rod. At the end of this motion the coupling is drawn back and the entire rod subjected to a predetermined tension. This flexing and tensioning is cylically repeated in piston-like fashion until the rod or one coupling fails. Failure usually takes place just back of the upset or at some section of the rod further removed, but many true pin breaks also occur. In short, all the types of failure encountered in practice are reproduced in this machine. Obviously, if a fair number of specimens of each make are tested in this manner, under identical conditions, the one withstanding the greatest number of cycles is likely to give the least trouble in service.

Uniformity of test results for any given make should be a matter of concern also, because if any manufacturer is unable to maintain a close range of limits in the properties of his product, the user desires to know that. A hundred good rods in a hole will avail little if the next one in line is a poor one.

Summary

Summarizing these considerations, it is my opinion that a user of sucker rods should select this class of equipment on the basis of careful laboratory analysis and not by expensive field tests, and that the only tests necessary are those to determine:

1. Fatigue strength of made-up joint and rod.
2. Fatigue strength of rod steel (center section.)
3. Modulus of elasticity.

The greater the magnitude of each of these three quantities, the better is the rod.

CANADIAN FIELDS

(Continued from Page 84)

feet. In the Jumping Pound district west of Calgary, Imperial Bow River No. 1, LSD 15, Section 12-25-5w5, has completed the work of plugging and abandoning the well.

It is unoffically reported that negotiations are in progress for the taking over by the Foothills Oil & Gas Co. or some other Imperial subsidiary of acreage held by the Alberta Pacific Consolidated, Ltd. close to the Home Oil Co. wells in Section 20-19-2w5. The Alberta Pacific Consolidated, Ltd. also holds considerable acreage in the Irma-Wainwright field, but if any deal is contemplated, it is not likely to be concerned with anything except the Turner Valley holdings.

On the Morley Indian Reserve, Gold Coin Oils, Ltd. is reported drilling in a very hard formation at 3,502 feet. Wabash Oils, drilling in the same general area, is reported cementing casing in the Kootenays after getting a fair show of oil and a little gas.

In the Skiff field, southern Alberta, Devenish Petroleum No. 1, LSD 5, Section 27-5 14w4, is at 3,130 feet and having some trouble with casing. The 6¾-inch string parted at 400 feet from the top and is being pulled and will be run again. It is claimed that same gas and salt water has been met in deepening the well below the oil sand at 3,090 feet. It is reported that arrangements are being made between the Devenish interests and the Illinois-Alberta Oil & Refining Co. for the development of 1,280 acres west of Skiff and northwest of the Devenish well, in townships 6 and 7, ranges 14 and 15, w4.

Pincher Creek

In the Pincher Creek area, southwestern Alberta, Mount Royal Oil & Gas Co. No. 1, LSD 4, Section 7-6-1w5, has resumed drilling at 250 feet after a shut down of several months waiting for additional equipment.

In the Viking field, east of Edmonton, Northwestern Utilities, Ltd. No. 14 has been brought in with a production of 5,000,000 feet a day from the Viking sand. No. 13, completed about six weeks earlier, had production of 8,000,000 feet a day. The two wells are being connected with the system supplying gas to Edmonton.

On the Montana side, an important wildcat test is being drilled by T. B. Kyle and associates of Winnipeg on the Bow and Arrow structure southeast of Coutts. The location is SE. SW, Section 20-37-1w3, and is 3½ miles south of the international boundary. The test, located by Ralph Arnold, was at last reports down over 200 feet. The same interests drilled the S. Hart Green-Lerum in SW, Section 11-37-2w, and were planning to drill a second test, but ultimately shifted to the present location, which is claimed to be 800 feet higher on the structure. The Bow and Arrow No. 1 is 6 miles from the S. Hart-Green-Lerum. J. W. Elliott of Montana is the contractor. The 18-inch casing has been set at 200 feet. It is claimed that oil production should be reached in the Ellis sand around 2,400 feet, with possible gas flows at the base of the Colorado and in the Sunburst sand. The surface formation is the Colorado (Benton) which should be not more than 1,800 feet, with 450 feet of the Kootenay, 250 feet of the Ellis and 780 feet of the Madison limestone.

Nearing Border

Drilling in Montana has been steadily working closer to the Alberta border. The Kropp well west of Sunburst is stated to be the nearest production to the border. It was given a shot recently, but the results are still uncertain. The Overseas Petroleum Co. is drilling a test 1½ miles southeast of Sunburst and is near production, being considerably below 1,200 feet.

In the Calgary district, Anglesey-Lakeview No. 1, LSD 1, Section 22-21-1w5, is at 708 feet and drilling. In the Alders'side district, Ranchmen's Gas & Oil Co., LSD 16, Section 13-20-29w4, is drilling at 1,400 feet.

Near Olds, Alberta, the Coates syndicate test, LSD 13, Section 28-32-1w5, is reported shut down at 286 feet.

In northern Alberta, in the Lesser Slave Lake district, International Oils, Inc. No. 1, Section 14-74-4w5, has been definitely abandoned at 2,840 feet. No. 2 has been located on the north shore of the lake, and will start drilling this fall.

Ribstone-Blackfoot

On the Ribstone-Blackfoot structure, east of the Irma-Wainwright field, Ribstone Oils, LSD 1, Section 1-46-1w4, is reported drilling at 1,925 feet. Development in this area has been very slow. Last year the structure received a great deal of prominence, owing to a favorable report by Dr. G. S. Hume of the Geological Survey of Canada, following the discovery of oil and gas indications on the Saskatchewan end of the structure, near Lloydminster. Since then some 14 locations have been made, 10 of them on the Alberta side and 4 in Saskatchewan. Of the 10 in Alberta, only 3 have reached the drilling stage. Imperial Oil, Ltd.-Ribstone No. 1, was abandoned after being drilled to 3,489 feet depth. This test got a show of heavy oil around 1,900 feet, which failed to prove up when tested but which may be regarded as a reasonable indication of commercial production at a more favorable point on the structure. Ribstone Oils, LSD 1, Section 1-46-1w4, at 1,925 feet should be close to this potential production. The only other drilling test on the Alberta end of the structure, Advance Oil Co. No. 3, LSD 1, Section 16-45-1w4, is reported practically inactive at 504 feet and seems to have done little or no work this season. On the Saskatchewan end, London-Ribstone Oil syndicate, LSD 14, Section 10-43-3w3, is the only test to start drilling this season. It is at 255 feet and shut down waiting for casing, but is planning to go right ahead and may get the heavy oil sand around 1,900 feet this fall. On the Saskatchewan end of the structure surface indications of oil have been more numerous than in Alberta and production may be nearer the surface.

On the Alberta end, locations were made for Advance Oil Co. No. 4 on LSD 15, Section 32-44-1w4; Glenbow Oils, W half Section 24 44-2w4; Oil Producers Corp., Section 14-44-2w4; Oxville Oil & Gas Co., Section 10-45 2w4; Pinnacle Oils No. 1, LSD 12, Section 20-45-1w4; Ribstone Petroleums, Section 10-43-3w4; Ribstone Wainwright Oils, Section 29-43-2w4. In Saskatchewan locations include Crest Oil Co., LSD 12-13, Section 12-46-28w3; Marren-Lloydminster Syndicate, NE. Section 24-8-28w3; and Ribstone Drilling Syndicate, NE, Section 22-46-28w3.

Saskatchewan

In Saskatchewan, the Anwood Oil Co. has been organized with $500,000 capital and office at Rosetown, Sask. W. C. Gordon, M. E. of Washington is president and J. A. Woodward secretary treasurer of the company, which will probably undertake development work on the Mountain View structure near Rosetown.

In the Simpson district, Simpson Oil Co., Section 8-29-26w2, is reported drilling at 800 feet. The well resumed drilling about two months ago after being sanded up to 187 feet. The original hole was cleaned out to 323 feet, and since then deepened, the 10-inch casing being set at 376 feet.

In the Unity Valley district, near Vera, Saskatchewan, the Unity Valley Oil Co. No. 1, SE, Section 23-41-24w3, is reported drilling at 2,925 feet.

In Manitoba the Irro Oil & Gas Co. No. 2, LSD 11, Section 18-26-23w1, is reported shut down at 125 feet. In the Ochre River district, the Mack Oil & Gas Development Co. in LSD 12, Section 39-22-17wPM. is reported at 448 feet and shut down.

Ontario

In Ontario, the United Development Co. of Chatham is planning to develop some acreage in Elgin county, near St. Thomas. The St. Thomas city council has been approached with regard to the sale of gas in that city. Further east there is considerable gas production in the Vienna and Richmond fields, but the immediate vicinity of St. Thomas has never been thoroughly tested.

In Kent county the Union Natural Gas Co. No. 272, Shanks farm, Romney township, is reported drilling at 1 280 feet for a test of the Tilbury gas sand. Union No. 273, Jackson farm, Romney township, is drilling at 750 feet.

In Lambton county, Union Natural Gas Co. No. 18 on the Mackie farm, Dawn township, is rigged up ready to spud in. At Rock Glen near Arkona W. J. Hyatt and associates are rigging up with a new standard outfit for a third test of the Trenton formation in that locality.

CALIFORNIA FIELDS

(Continued from Page 84)

which usually sets in following completion. The failure of this field to hold up has resulted in several suspensions and all future work will be curtailed. The California Eastern Oil Co. shut down last week, while the Berry Oil Co. is abandoning its No. 1 Cavaletto in Section 1-4-29. The Miley interests are likewise discontinuing work on two or three projects and future drilling will be reduced to a minimum unless the deep test, No. 1 Goleta, now down 5,330 feet, reveals the existence of deep production, which hardly seems probable at present. The Barnsdall, following three unsuccessful cement jobs, has resumed drilling on its No. 1 Edwards, west of the Miley interests, and while a sufficient thickness of oil sand to warrant production had been encountered, inability to shut off water prevented a successful completion.

Northern California Wildcats

There was practically no change in the status of the Pacific Eastern Production Co.'s wildcat in the Casa Loma area at Bakersfield, although the company is still making a very determined effort to secure commercial production. Interest in this entire area is still at fever heat and considerable work is scheduled to get under way within the next three or four months. The Standard recently paid a cash bonus of $16,000 for 280 acres in the Oil Junction district and, while drilling in this instance will not get under way for some time yet, it indicates the position of the major companies. Graham & Young have a rig going up for a wildcat a little over 3 miles southwest of the Milham Exploration Co.'s two wildcats in the Buttonwillow area and drilling is scheduled to get under way within the next two weeks. Graham & Young have a total of 5,800 acres under lease while the Shell holds 2,300 acres for protection purposes. The Shell is also heavily interested further north. Graham & Young are working on the assumption that there is a fold running from Lost Hills to Elk Hills and the correlation of various well logs tends to support this theory. The Pacific Eastern recently tied up several hundred acres at Delano where the North American Consolidated has a wildcat already under way on the Wallace ranch.

A revival of drilling activities in the area around Summerland and Carpinteria near Santa Barbara is due within the next few weeks. The Shell, General Petroleum and Associated are all heavily interested in this section and the General Petroleum is contemplating an early test of its Pythian lease near Carpinteria. The Shell will soon undertake a deep test on Ortega Hill back of Summerland and this work will undoubtely bear watching. The Standard is abandoning its Montalvo wildcat in Ventura County as a duster at 6,796 feet but the company will undoubtedly continue work near Camarillo where its wildcat in that section showed a little oil at 5,488 feet. The Chanslor-Canfield Midway Oil Co. has resumed drilling in both of its two wildcats in the Seacliff area, the present formation being a sandy shale streaked at frequent intervals with oil sand. The Union Oil Co. and California Petroleum have staked a location for a new wildcat in San Luis Obispo County and work on this test should be watched very closely as the outlook is exceptionally promising. The Shell, with something like 10,000 acres under lease near Oxnard, is attempting to secure an extension of six months and all indications point to the fact that this request will be granted. The company is going over the entire area with a torsion balance and finds it impossible to decide on the locations of the three wells which it agreed to drill. The Shell has expended approximately $250,000 in this section during the past two years and it will require another $60,000 to secure the extension of time requested as this acreage is all held on a monthly rental basis. In the northern part of the state the Shell has two wells under way in Sonoma County and another in San Mateo but no particularly favorable indications have been found in either locality to date.

Southern California Wildcats

The outstanding development in southern California wildcat circles during the past week was the resumption of work at Potrero by the Associated Oil Co. and this wildcat, which is located between the Rosecrans and Inglewood Fields, was flowing a small amount of mud, oil sand, water and gas this morning after several hours of continuous swabbing. No accurate prediction can be ventured as to the outcome of this test up to the present writing, although the well may be on production before this report is cold. The Associated has maintained a strict watch over this test during the past two or three months and guards prevent access to the rig. Scouts, however, have been maintaining a constant vigil and the crew has worked with the headlights of the scouts' automobiles turned on the derrick for some time.

PENNSYLVANIA GRADE

ATLANTIC CITY, N. J., Sept. 17.—At a directors' meeting of the Pennsylvania Grade Crude Oil Association held here, the following new association officers were named: J. P. Flynn, Sistersville, W. Va., president; I. H. Shearer, Bradford, Pa., vice president; E. M. Lyons, Clarendon, recording secretary; and Samuel Messer, Oil City, Pa., treasurer.

A. G. A. MEETING

The manufacturers' section of the American Gas Association will meet at the Hotel Stevens, Chicago, Illinois, on Monday afternoon, October 10 at 2 o'clock in the West Ballroom, third floor, in connection with the convention and exhibition of the American Gas Association to be held in Chicago, the week of October 10.

METHODS EMPLOYED IN STANDARDIZATION WORK

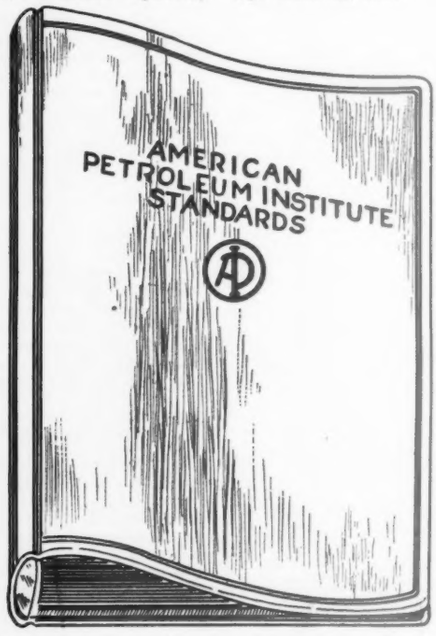
(Continued from Page 120)

Drilling Taper Joints now in the process of manufacture	50,000.00
"Working" Gauges of all types, expended to date (estimated)	250,000.00
Grand total	$500,000.00

The above figures do not take into account new machine tools, special equipment or other improvements, etc., in the various manufacturers' plants, for which several hundred thousand dollars has been spent. The figures given on "Master" Gauges are based on an actual canvass of the principal gauge manufacturers in the United States.

A.P.I. Handbooks

All specifications and codes on field practice are issued in printed form, convenient pocket size 3¾ by 7 inches. Each specification is bound separately and punched to fit in a suitable loose-leaf ring binder. These binders are available in either genuine leather or Fabrikoid (imitation leather). Press board binders can also be supplied for transfer purposes and field use. All handbook covers and specifications are sold at prices to cover printing and distribution costs. The above is an illustration, and prices, of the American Petroleum Institute Handbook.



A.P.I. Handbook Prices

Size of ring	No. sheets Capacity (with index)	Fabrikoid (Imitation Leather) Price each	Genuine Leather Price each
¼-inch	70	$1.65	$3.25
½-inch	120	1.75	3.50
1-inch	250	2.00	3.75

The foregoing handbook prices include Bulletin S-1, Bulletin S-2, all committee rosters and one set of index sheets. Specifications are extra at the prices shown.

Pressboard Covers: Punched to fit A.P.I. Handbook Specifications. Suitable for transfer binders or field use where a semipermanent binder is desired. Price each, bare, 10 cents; price each, including Bulletins C-1, S-2, all committee rosters, and index, 75 cents.

Stamping Individual Names on Cover: 35 cents per line, extra.

When ordering handbooks, please follow the form shown below. Be sure to indicate the specifications desired; otherwise it will be assumed that you desire all specifications. Remit by post office money order or by check. Please do not send stamps. Prices shown are postpaid to all points in the United States, Canada and Mexico; carriage charges to foreign countries, extra.

SAMPLE ORDER FORM

American Petroleum Institute, Division of Standardization,
1508 Kirby Building, Dallas, Tex.

Gentlemen: Please send us, postpaid,.....A.P.I.
(Total Quantity)
Handbook Covers, as follows:

.....Fabrikoid, ¼-inch ring, @ $1.65 each..... $.....
(amount)
.....Fabrikoid, ½-inch ring, @ $1.75 each..... $.....
.....Fabrikoid, 1-inch ring, @ $2.00 each..... $.....
.....Leather, ¼-inch ring, @ $3.25 each..... $.....
.....Leather, ½-inch ring, @ $3.50 each..... $.....
.....Leather, 1-inch ring, @ $3.75 each..... $.....
.....Pressboard Binders @ $ .10 each..... $.....
Individual names, as per attached list, at 35 cents per line..... $.....
.....Specifications, as per attached list..... $.....

Total ..... $.....

Check for $.....inclosed in payment.
Send cover to.....
.....
.....
Send all data on revisions, etc., to.....
Yours truly,
.....

A record is kept of each handbook owner, showing specifications desired by him. Each handbook owner is automatically sent copies of the various specifications when adopted and issued, including any amendments or revisions.

Status and Prices of A.P.I. Specifications

Following is the status and prices of the various specifications issued to date:

Belting: Includes final specifications on leather, impregnated stitched cotton fabric, rubber and balata; tentative specifications on solid woven hair and solid woven cotton.

Issued as "A.P.I. Standards No. 1, Third Edition." Price 25 cents each.

Boilers: Includes specifications on four sizes of locomotive-type boilers.

Issued as "A.P.I. Standards No. 2, Third Edition." Price 15 cents each.

Cable Drilling Tool Joints: Includes specifications on 11 sizes of taper joints for cable tool drilling.

Issued as "A.P.I. Standards No. 3, Third Edition." Price 30 cents each.

Standard Rigs and Derricks: Includes specifications on six different sizes of derricks for drilling and pumping (made of structural steel, tubular, or combination wood and steel), standard rig parts, such as bull calf wheels, sampson posts, walking beams, band-wheels, etc.

Issued as "A.P.I. Standards No. 4, First Edition." Price 25 cents each.

Tubular Goods: Includes two specifications as follows:

Casing, drill pipe and tubing—Issued as "A.P.I. Standards No. 5-A, Third Edition." Price 40 cents each. (Revisions adopted at Colorado Springs, 1927, to be issued as Supplement No. 1.)

Line pipe, including tentative specifications on threads and plain end line pipe—Issued as "A.P.I. Standards No. 5-L, First Edition." Price 35 cents each.

Rig Irons: Includes specifications on three sizes of rig irons—4½-inch, 5-inch, and 6-inch—and five sizes of sand reels.

Issued as "A.P.I. Standards No. 6, Third Edition." Price 30 cents each.

Rotary Drilling Equipment: Includes four specifications as follows:

Transmission standards for keys, shafting, chain and sprocket tooth form—Issued as "A.P.I. Standards No. 7, First Edition." Price 30 cents each.

Miscellaneous rotary standards, including recommended practice on methods of measurement, standard taper on rotary spiders, etc.—Issued as "A.P.I. Standards No. 7-A, First Edition." Price 5 cents each.

Rotary drilling taper joints, including specifications on seven different sizes of joints, also tool joints, drill collars, fish-tail bits, grief stems and couplings—Issued as "A.P.I. Standards No. 7-B, First Edition." Price 30 cents each.

Line shafts for rotary drilling, including specifications for three sizes of line shafts—Issued as "A.P.I. Standards No. 7-C, First Edition." Price 15 cents each.

Wire Rope and Manila Cordage: Includes two specifications:

Wire rope—Issued as "A.P.I. Standards No. 9-A, Fifth Edition." Price 30 cents each.

Manila cordage—Issued as "A.P.I. Standards No. 9-B, Second Edition." 20 cents each.

Pumping Equipment: Includes four specifications as follows:

Working barrels (both cold drawn and machined)—Issued as "A.P.I. Standards No. 11-A, First Edition." Price 20 cents each.

Sucker rods, three sizes—Issued as "A.P.I. Standards No. 11-B, First Edition." Price 30 cents each.

Internal combustion engines, standard rating method and clutch and reverse gear flange connection—Issued as "A.P.I. Standards No. 11-C, First Edition." Price 20 cents each.

Miscellaneous pumping equipment standards, including working barrel parts, polish rods, pressure gauge taps and fittings at well heads, etc.—To be issued as "A.P.I. Standards No. 11-D, First Edition." Price on application.

Steel Tanks for Oil Storage: Includes tentative specifications for large steel storage tanks and bolted production tanks. Available in mimeograph form only.

Purchasing Department to Adopt A. P. I. Standards on Materials

By S. H. KEOUGHAN
President, Continental Oil Co.

I want to congratulate the standardization committee of the American Petroleum Institute on its accomplishments to date. I consider it a very fine piece of work and one that has taken a great deal of time and attention.

I think this service is one that should be appreciated by everyone in the oil industry and will result in a tremendous saving and a great convenience to the operators.

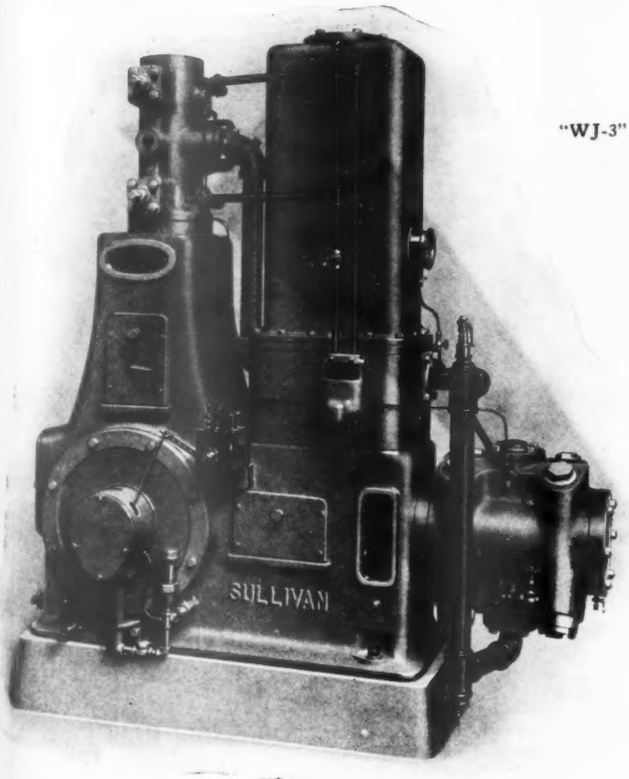
It is my intention to have our purchasing department adopt the American Petroleum Institute specifications on all materials that are purchased and used in our operations.

H. F. MATTERN
Tubular Goods.

CHARLES JACOBSON
Chairman, Mid-Continent District Subcommittee on Oil Field Boilers.

Find the Oil and Raise It

With Dependable Sullivan Equipment



"WJ-3"

Sullivan Angle Compound Compressors for Gas or Air Lift

At the Petroleum Exposition (east end of Lot H) you will see two Sullivan "WJ-3" Gas Lift Compressors; one mounted on skids with short belt drive from Fairbanks-Morse motor; the other, with direct drive from Foos gas engine.

"WJ-3" Compressors were designed especially for gas lift and air lift oil pumping. They are available in a range of capacities and pressures suited to the varying needs of the oil fields, for increasing output by putting pressure on the sands.

These compressors can be driven by short belt or tex-rope drive from electric motor or gasoline engine or by direct connection to synchronous motor, Fairbanks-Morse Diesel Engine, or Foos gas engine.

Write for Catalog 1583-G.

Sullivan Gas Lift Compressors, and Sullivan Portable Compressors, and Portable Hoists are distributed in the Mid-Continent Field, by the Continental Supply Co., St. Louis.

Diamond Drill for Structure Testing

This drill will take a 2-in. core at 2000 ft. A 30 H.P. Buda Gasoline Engine Supplies power. The whole outfit is mounted on a sturdy steel frame, with wide steel wheels, and standard track gauge. It will go anywhere a team or tractor can go.

Sullivan Diamond Drills for Finding the Oil

(See Booth No. 120, Geo. E. Failing, State Agent for Sullivan Diamond Drills.)

Finding the oil is the job of the Sullivan Diamond Core Drill. This drill will tell you definitely whether or not oil is present, exactly where it lies, and the exact nature of the overlying strata.

Diamond Drills are especially effective for structure testing. The exact information furnished by the Diamond Drill Core simplifies the work of determining the location of the domes, and costs thousands of dollars less than wild-cat drilling.

During 1926, one large oil company bored 221,000 feet of hole with 9 Sullivan Portable Diamond Drills. One of the drills bored 5554 feet in one month, and moved eleven times. Deep tests are made with the "FK" and "P-2" drills. The "P-2" will take core at 4000 feet and the "FK" has taken core below 6000.

Write for the 80-page Handbook, "Diamond Drilling for Oil."

Dependable Water Supply With Air Made Wells and Sullivan Air Lift

A working model of the Air Made Well, pumped with Sullivan Air Lift will be shown at the Petroleum Exposition. The ability of the Air Made Well to furnish a dependable water supply from shallow sands will interest all oil men.

Ask for the *48-page Handbook, 1571-I.*

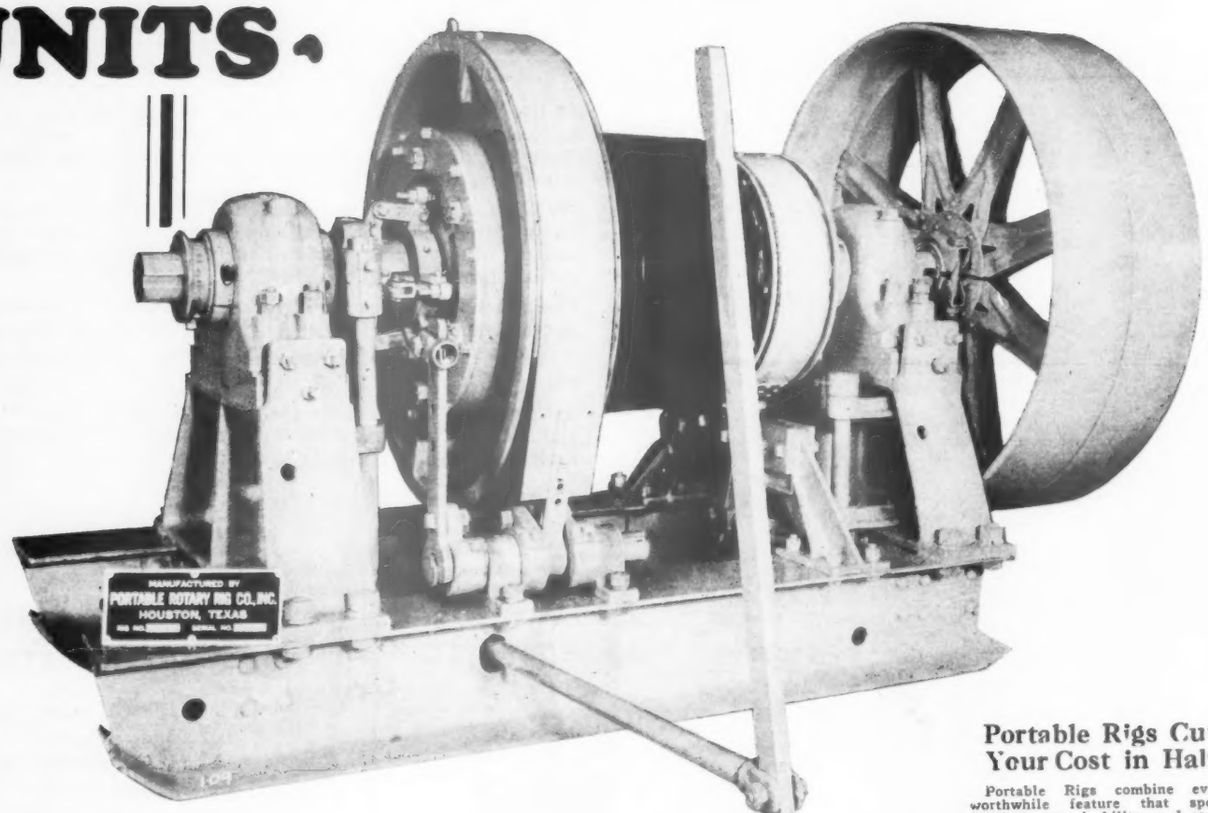
SULLIVAN

Dallas Oklahoma City
Tulsa Garber
San Francisco

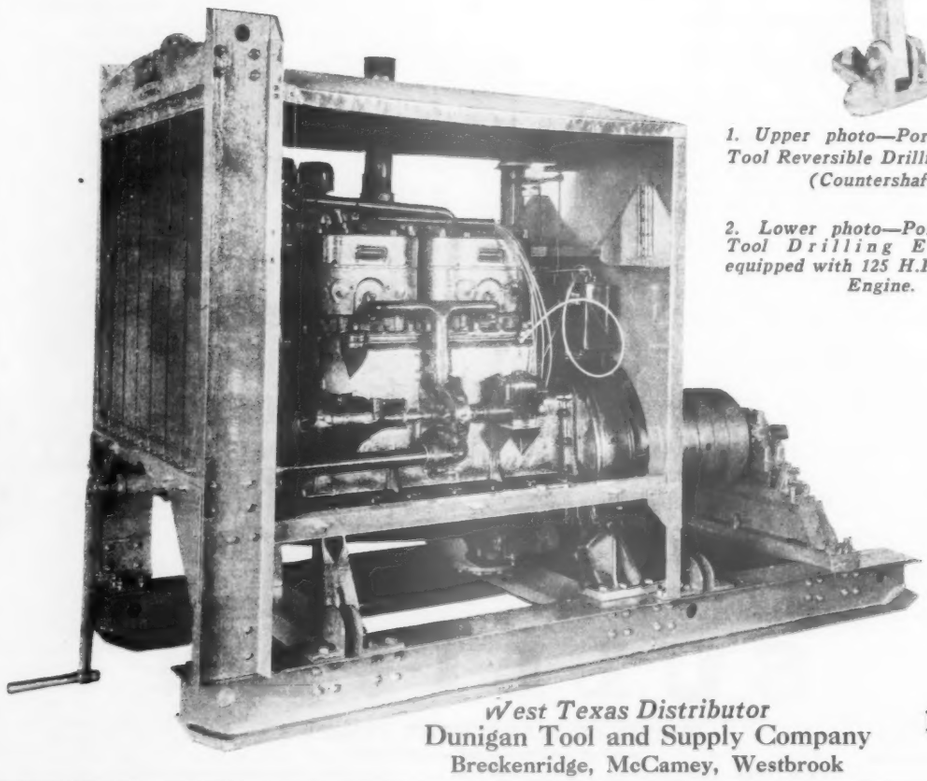
SULLIVAN MACHINERY COMPANY
88 E. ADAMS ST., CHICAGO

St. Louis Denver
Muskogee El Paso
Salt Lake City

PORTABLE
CABLE TOOL DRILLING UNITS



1. Upper photo—Portable Cable Tool Reversible Drilling Clutch—(Countershaft).



2. Lower photo—Portable Cable Tool Drilling Engine Unit, equipped with 125 H.P. Waukesha Engine.

Portable Rigs Cut Your Cost in Half

Portable Rigs combine every worthwhile feature that spells economy, practicability, and speed in DRILLING AND PUMPING WELLS.

* * *

Can be operated where water is so scarce that drilling with steam would be an impossibility.

* * *

Fuel—Lubricating oil and a minimum of cooling water is all that's necessary to maintain continuous twenty-four hour service.

* * *

No boilers or steam engines required.

* * *

Can be moved rapidly and cheaply from one job to another.

Can Be Used for

Drilling with cable rigs.

* * *

Drilling with rotary rigs.

* * *

Bailing with cable rigs.

* * *

Pumping single wells or furnishing power for a number of wells.

* * *

Pulling rods, tubing, or casing.

* * *

Cleaning and swabbing.

* * *

Running mud pumps.

* * *

Compressor drives to blow air.

* * *

Operating high pressure line pumps.

West Texas Distributor
Dunigan Tool and Supply Company
Breckenridge, McCamey, Westbrook

Mfg. and Distributed by
Portable Rig Company
Houston, Texas

CENTRAL WEST FIELDS

(Continued from Page 86)

other being a very light producer, hardly worth the pumping. This is Gray and others' No. 6 well, 1,120 feet from the south line and 660 feet from the east line of the John Wirtz farm, in the southeast quarter of Section 30, Center Township, Gibson County. This well got a sand from 1,575 to 1,586 feet and went to a total depth of 1,675 feet. The hole was plugged back to a depth of 1,604 feet and given a 40-quart shot, and a production of but 1 bbl. initial. In the same township, J. D. Riggs and others' test in the northeast corner of the Frank Watkins farm, in the northeast quarter of Section 14, failed to make any showing at 1,497 feet and was abandoned as dry.

In Veale Township, Daviess County, Hartman and Sargent's test, 750 feet from the north and east lines of the Bob May farm, in the northeast quarter of Section 11, proved a rank duster at a depth of 1,300 feet.

In the Dogwood area of Harrison County, in the extreme southern part of the Hoosier State, the Louisville Gas & Electric Co.'s No. 1 on the W. S. Beatrick farm is a fair gas well, as is its second test on the Henry J. Buse farm, same area. The gas was found at close around 700 feet.

Nash and Dean are drilling a wildcat well on the William Steele farm, northeast of Tipton, on a block of 6,000 acres of lease, in Tipton County.

No new developments are reported from Adams County in the old Trenton Rock area of eastern-central Indiana, but an advance in crude prices would mean the testing out of large areas overlooked in the early drilling campaign of years ago.

Illinois

Little is reported from the Illinois Field the past several days, as drilling operations are quiet. Clark, Cumberland and Lawrence Counties failed to report any completions and the Allendale Field of Wabash Township, Wabash County, had one completion, being the Adams Corner Oil Co.'s No. 10 well, 200 feet from the north line and 600 feet from the west line of the Mack Madden farm. This well was drilled only to the shallow Bridgeport sand topped at 1,020 feet and at 20 feet in the sand showed a gas volume of 1,500,000 feet, which will add materially to the needed supply of natural gas for fuel purposes in the field.

In Centralia Township, Marion County, the Petro Oil & Gas Co.'s No. 14 well, 288 feet from the north line and 396 feet from the west line of the John Kinsey farm, in the northwest quarter of Section 30, struck top of sand at 756 feet and drilled 38 feet in the sand, the initial production amounting to 9 bbls.

In Jacksonville Township, Morgan County, near the central portion of the State, Timberlake & Higgins' No. 9 on the Mahon farm, Section 8, is reported to have pumped 19 bbls. in 8 hours from a depth of 291 feet. Erwin and others' No. 5 on the O. F. Conklin farm, in the southwest quarter of the southeast quarter of Section 18, is reported a dry hole. Timberlake and Higgins' No. 10 on the Travis farm, in the same area, is reported making a very good showing for a commercial oil producer.

Central Ohio

An even dozen completions were reported from the Central Ohio Field since the last report, of which two were producers with an initial production of but 3 bbls., three dry holes and seven gas wells. The two oil wells, being small, were found in the Chatham Field of Chatham Township, Medina County, both on the Wertz property.

In Knox County, Bell Brothers' No. 3 well, 300 feet from the north line and 500 feet from the east line of the Allen Clark 80 acres, Section 20, Butler Township, came in a dry hole. No. 2 on this farm was a very light gas well, hardly worth connecting up, being reported at less than 30,000 feet initial. The East Ohio Gas Co. made a location for a test on the Michael Strang farm, Section 20, Jefferson Township.

In Ashland County, Clear Creek Township, the Kemrow Co. drilled a gas well at a test in the southeast corner of the Glen Calhoun 31 acres, Section 10, Ringler and others are drilling a test in the southwest corner of the W. H. Heiffner 4 acres, Section 11, and made a location for a test on School Lot No. 6, in Section 12. In Green Township, the Ohio Fuel Gas Co.'s test in the northwest corner of the J. W. Kettering 70 acres, Section 70, is a light gas well. In Troy Township, the Logan Gas Co. brought in a fair gas producer at a test 500 feet from the south line and 297 feet from the west line of the R. E. Campbell 30 acres, Section 2, and Hulse & Kundtz are drilling their No. 3 on the Ray Arnold 104 acres, Section 2. In Orange Township, the Logan Gas Co. is drilling a second well on the Clayton Harmon farm, Section 18, as well as drilling No. 2 on the Ross Langford farm, in Lot 99, Sullivan Township, and has made a location for a test on the David F. Hay farm, Section 19, Hanover Township. The Kemrow Co. has started drilling No. 4 on the S. Sponsler 139 acres, Lot 100, Sullivan Township.

In Medina County, Lafayette Township, the Hawk Gas Co.'s test in the northwest corner of the M. E. Shinn 52-acre farm, Section 7, came in a dry hole. In Chatham Township, the E. R. Edson & Son Co.'s No. 27 well, 345 feet from the south line and 422 feet from the east line of the W. P. Wertz farm, Lot 5, Section 14, pumped 2 bbls. at 385 feet, and No. 28 well, 964 feet from the south line and 409 feet from the east line of the same farm, pumped 1 bbl. at 380 feet.

In Lorain County, Columbia Township, the Ohio Fuel Gas Co. found an excellent gas well at a test in the northwest corner of the F. G. and M. Howard farm, in the southeast quarter of Lot 15. Same company is now drilling its No. 1, 871 feet from the north line and 660 feet from the east line of the J. and H. Longbon 100 acres, Lot 12.

In Wayne County, Chester Township, Harmon and George made a location for a test in the northwest corner of the H. P. Gable 6 acres, Section 8, East Ohio Gas Co. is drilling a test 600 feet from the south and west lines of the John Weintzheimer 73 acres, Section 12, Chippewa Township, and the Logan Gas Co. made location for a test on the J. C. Cline farm, Section 20, Congress Township.

In Holmes County, Knox Township, I. E. O'Hail brought in a very nice gas well at a second test in the southwest corner of the Christian Kaylor 120-acres, Section 16. In Richland Township, the same party drilled a dry hole in a second test in the northeast corner of the Julius Dete 183-acre farm, Section 2. In the same township, the Logan Gas Co. is drilling a test 660 feet from the north and east lines of the Malissa Manchester 100-acre farm, Section 14, and the Kemrow Co. is drilling a test 660 feet from the south and west lines of the Frank Ledbetter 39 acres, Section 17.

In Monroe Township, Coshocton County, the Ohio Oil Co. is drilling a test near the northwest corner of the David Mohler 75 acres, Section 9.

W. E. Slaughenhoupt and others are drilling a wildcat well on the Charles Erhart 145 acres, Section 25, Troy Township, Richland County.

In Cuyahoga County, L. M. McGrath drilled a fair gas well at a test in the northeast corner of the A. E. Gage 7 acres, Lot 7, Dover Township. Arthur & Simpson are drilling No. 2 on the Hass lots, same area, and No. 1 is near the sand. J. W. Cushing is drilling No. 1 on the Harrison property, Lot 6. In Olmstead Township, Hulse & Kundtz have a gas well in the northeast corner of the E. Fisher 5 acres, Lot 27. J. W. Cushing is drilling No. 2 on the M. Slamack property, Lot 29, and Arthur and Simpson are drilling No. 1 on the W. J. and C. Neeson property, Lot 32.

In Summit County, Richland Township, John Arthur is drilling a test 550 feet west of the highway and 300 feet from the south line of the C. J. Neil 90 acres. The East Ohio Gas Co. set a stake for a test on the L. Wolf farm, Section 28, Franklin Township, same county.

ROCKY MOUNTAIN AREA

(Continued from Page 80)

at 1,215 feet, and after a shot made 15 bbls. initial. Wyoming Oil Fields Co.'s No. 16, SW Section 23-40-79, was completed at 1,152 feet and made 28 bbls. initial after a shot. Wyoming Associated Oil Co.'s No. 1, NW Section 26-40-79, was completed at 1,128 feet. It was shot, but failed to flow and will be pumped. Midwest Oil Co.'s No. 13, SW Section 35-40-79, failed to flow after a shot and will be put on the pump. It was completed at 1,215 feet.

Producers & Refiners Corp.'s No. 5, Section 10 32-95, in the Big Sand Draw Field in Fremont County, was reported a completion at 3435 feet. Open flow capacity was estimated at 30,000,000 feet. Same company's No. 2, Section 24-56 98, Garland Dome, which was intended for a deep test, but which had a fishing job that could not be overcome, is plugging back to 1,400 feet to make it into a gas well. It is being cased with 4½-inch pipe. Capacity is estimated at 4,000,000 feet a day. The rig will be skidded and a new test started. It will be near No. 2, but definite location has not yet been announced.

Ohio Gets Two

The Ohio Oil Co., reported two completions for the week in Wyoming, one of these being its No. 5 Harrison-Cooper, Section 3-19 78, Rock Creek Field in Albany County, which had an initial production of 125 bbls. from a total depth of 3 532 feet. The other was its No. 2 Cross Gas, Section 33 56-99, in the Byron Field. This has been reported completed at a previous date. Final report gives total depth of 3,163 feet, rock pressure, 1,400 lbs. A test of the gas shows about two quarts of low grade gasoline.

The Texas Production Co.'s No. 33 Crary, Section 9-33-76, Big Muddy Field, is being abandoned at 3,099 feet. Casing trouble at the bottom of the hole had delayed operations for some time and it was decided to quit on this well and start another. A heavy reinforced derrick is being erected and a rotary rig will be installed. Experienced rotary drillers from Texas will have charge of the test which has the Lakota sand for the objective. The Continental Oil Co. recently completed a 250-bbl. well in the Dakota sands in the Big Muddy. Several years ago the Midwest Refining Co. drilled to that horizon and found a limited production, but the test was not considered conclusive as to other parts of the field. Big Muddy has been producing from the Wall Creek, which lies above the Dakota, since 1917.

Among the wildcats, several wells are approaching an interesting stage. In the La Barge district in the southwestern part of the state, California Petroleum Co.'s No. 2, in the NW cor SE Section 34 27-113, was drilled to 4,670 feet with cable tools and now is rigging up with rotary drill to continue. Same company's No. 6-I, in Section 34-27-113, is in an oil sand at 804 feet. It is not yet known what it will make. Texas Production Co.'s diamond drill test, No. 1 Cortez, NW Section 15-26-113, is drilling in a water sand at 643 feet.

The Buck Creek Oil Co.'s No. 1 Delahoyd, Section 25-37 63, Niobrara County, which swabbed 250 bbls. a day until tankage was full from a total depth of 3,975 feet, has not made any progress since that report waiting for additional tankage to take care of the oil while the hole is being cleaned and cased.

In the Oregon Basin, in Park County, the Producers & Refiners Corp. has definitely decided to drill a test on the acreage recently secured, but location has not yet been announced. The Continental Oil Co.'s No. 1 State, Section 16-51-101, is drilling at 840 feet. Ohio Oil Co.'s No. 1 Batson, Section 27-53-100, is bottomed at 1,565 feet and underreaming.

The Texas Production Co. is starting a test on the Alkali Butte structure in Fremont County, south of Riverton, its location being SE NW Section 1-33-95. Camp has been installed and rig completed. Continental Oil Co. drilled in that region a few years ago and encountered considerable gas in the Wall Creek, and some shallow wells had a small production in the Shannon sand. The structure has an unusually steep dip and several attempts to drill in the past had difficulty with crooked holes.

In the Black Mountain District, Utah Oil Refining Co.'s No. 1 Avery, NW, Section 5-42-90 is in a soft fine white sand at 3,389 feet, showing a little oil. This is the Tensleep, the Embar failing to show anything worth while. It will suspend drilling until outcome of a nearby test to the Amsdens is completed. Same company's No. 1 Fort Collins, SE Section 26-43-91, is running tubing and rods preparatory to making a test of production from the Amsden sand. Same company's No. 2 Weller, NE Section 35-43-91, has rebuilt rig destroyed by fire, and is shut in. It found oil in the Embar sand at 2,918 feet.

Producers & Refiners Corp.'s No. 3, Section 2-19-88, Hatfield Dome, Carbon County, is testing at 3,938 feet. This company has 10 wells drilling in Wyoming at present and has two or three more lined up for early drilling. One of these will be in the Baxter Basin area in Sweetwater County, and another on Oregon Basin Dome in Park County.

Utah Oil Refining Co.'s No. 7-A, Section 2-26-90, Lost Soldier Field, has been completed at 2,525 feet and is on the pump.

The Marhalexom Oil Co. has a shale well on Section 11-38-78, on the east side of the Teapot Dome reported averaging 25 bbls. a day. This company has about 2,000 bbls. of crude in storage awaiting a market.

New Mexico

The Texas Production Co.'s No. 1 Rhodes, NE NW Section 22-26 37, Lea County, continues to hold the spotlight among the New Mexico wildcats. After showing for 16,000,000 feet of gas at 3,105-7 feet, the quantity dropped to 14,000,000 feet and the well commenced spraying a little oil. It looked for a while as if the well was drilling itself in as an oiler. However, drilling was resumed without any important change until another gas strike was made at 3 130 feet, the volume being 3,000,000 to 4,000,000 feet. The test is shut down at 3,131 feet waiting for socket, the tools being in the hole. The gas flow remains about the same. This is the third show of gas within the last 100 feet.

Other Lea County tests show little of importance. The Exploration Co.'s No. 1 Record, C NE Section 25-19-35, topped the lime at 3,660 feet and is drilling at 3,715 feet. Inglefield & Bridges' No. 1 State, SE cor. Section 4-17-34, after swabbing 270 bbls. in seven days from a total depth of 4,912 feet, has resumed drilling and is in gray lime at 4,970 feet. The Texas Production Co.'s No. 1 Jackson, Section 4-20-34, is drilling out cement at 3,190 feet at which depth the 8¼-inch casing was set. The base of the salt was encountered at 3,173 feet and was topped at 1 530 feet, this being one of the thickest salt beds drilled in that area. Same company's No. 1 Lockhart, Section 5-22-38, is drilling in salt at 2,390 feet.

Another Lea County test is being started by the Midwest Refining Co. in its No. 1 State, NE cor. Section 9-19-38. Location is 270 feet from north line and 250 feet from east line. Material is being moved in.

Several completions were reported in Eddy County, the Empire Gas & Fuel Co.'s No. 3 A Russell, Section 35-17-27, making an initial production of 25 bbls. from a total depth of 1,625 feet, and the Operators Oil Co.'s No. 16 State, NW cor. NE Section 4-18-28, making an initial production of 15 bbls. from a total depth of 2,411 feet. The Empire well was shot with 60 quarts at 1.593-1,611 feet, and the other with 80 quarts at 2,235-2,300; 40 quarts at 2 130-40; and 20 quarts at 2,104 8 feet. W. A. Stone Oil Co.'s No. 1 Hnulick, Section 25-17-26, was plugged and abandoned at 2,900 feet. R. D. Compton's No. 4 Mann, SW cor. NW Section 4-18-27, has commenced spudding. Compton's No. 1 State, Section 2-18-27, was completed at 1,624 feet

with an initial production of 25 bbls. Sand at 1,604-24 feet was shot w th 30 quarts. Ross & Grimm's No. 1 Daugherty, NW cor. SE Section 3-17-27, is drilling at 1,300 feet. This former'y was Clark & Grimm. Eastland Oil Co.'s No. 1 in Section 23-17-27, is drilling at 1,970 feet. Levers & Carper have made a location for their No. 5 in Section 3-18-28. Pueblo O'l Co.'s No. 2 Yates, SW SE Section 33-17-28, is moving in material. This is an offset to the Operators' producer. George F. Getty, Inc., No. 1 Rawson, Section 14-20-29, is drilling below 1,625 feet. Getty Oil Co.'s No. 1, Section 33-22-27, is drilling below 2,525 feet.

In Chaves County, Arena Oil Co.'s test on NW cor. SE Sect'on 18-13-31, is fishing for tools at 725 feet, and the Buffalo-Roswell Oil Co.'s test on Section 24-11-27, is shut down at 4,250 feet. Lane and Etz, and others, in the NW cor. SE Section 24-11-25, has resumed drilling and is in black lime at 1,030 feet. Texas Production Co.'s No. 1 Wilson, Section 29-17-18, Dunken Dome, has made a new contract and is clean'ng out 10 feet off bottom at a total depth of 4,506 feet.

In Curry County, Midwest Refining Co.'s No. 1 Rhodes, SW NW Section 30-8-31, is being abandoned at 3,650 feet. In Union County, the Blankenship Oil Co., reported to be a subsidiary of the White Eagle Oil & Refining Co., has taken over the Sun State Petroleum Co.'s No. 1 Passamonte, Section 14-24-30, which has been shut down for some time at 2,775 feet. Th's test has had several shows.

Two operations in Torrance County are active. San Juan Coal & Oil Co.'s No. 2 Randall, Section 20-6-10 is drilling below 4,475 feet, and Sinnock, Reynolds, and others's No. 2 DeHart, Section 12-7-7, is drilling at 345 feet.

In the San Juan Basin, the developments are mostly routine. Midwest Refining Co.'s No. 1 Hancock, Sect'on 1-17-9, Hospah Dome, McKinley County, is pulling 6¼-inch casing to plug back to a sand in the Mesa Verde at 2,525 feet. This is the company's only active operation in that district. In San Juan County, the Huntington Park Oil Co.'s No. 1 Terwill'ger, Section 29-30-9, is bottomed at 3,325 feet and shut down waiting for new cab'e. Some oil and gas is showing and the hole is believed to be just above a sand in the Mesa Verde. San Juan Petroleum Co.'s No. 1 Palmer, Section 17-29-13, which has been having water trouble, has been taken in charge by A. W. Miller, who will make a further effort to shut off the water. Huerfano Oil Co.'s No. 1 W.ltbank, Section 25-29-11, is underreaming to set casing. Total depth is around 800 feet. Kansas-Colorado Oil Co.'s No. 1 Atterbery, Section 24-31-11, has tools in the hole at 1,800 feet, with two strings of fishing tools on top of them.

Utah

The Continental Oil Co's No. 1 Boundary Butte, Section 22-43-22, San Juan County, is waiting for cement to set at 1,590 feet. Th s operation heretofore has been carried under the name of the Southwest Oil Co. Following the settlement of lease litigation by the passage of remedial legislation by congress, a new agreement for completing the test was reached among the several companies contributing to the operation and Continental will be in charge of the dr'lling. The showing in the Shinarump conglomerate at 1,568 feet, at which depth operations were suspended for two years, is being shut off to continue the ho'e to the Pennsylvanian sands.

Midwest Exploration Co.'s No. 1 Hughes Section 30-24-19, Elk Ridge Dome, San Juan County, is drilling in hard gray lime at 3,650 feet. It is doubtful if this test will be carried much deeper unless something of importance shows at an early date. Midwest Refining Co.'s No. 2 Ashley Creek, Section 23-5-22, a Sundance sand test near Vernal, is drilling in gray shale at 385 feet. The Texas Production Co.'s No. 1 Shipley, Section 5-27-14, Sweetwater Structure, is waiting for 15½-inch casing at 640 feet. Utah Southern Oil Co.'s No. 1 Canyon, Section 38-41-19, San Juan County, has not yet commenced making new hole with diamond drill, pending installation of equipment. Union Oil Co. of California's No. 1 State, Section 16-30-25, Lisbon Dome, is dr'lling in salt at 4,030 feet. The 8¼-inch casing was set at 3,800 feet.

Embar Oil Co.'s No. 1 Big Six, Section 34-25-21, Moab Dome, is drilling in hard gray lime at 4,390 feet. This is the first lime encountered below 2,000 feet, the hole having penetrated 2,000 feet of petrol.ferous shale. Some gas and rainbows are showing at present depth.

Montana

Work will begin immed'ately on the 115-mile gas line to be laid by the Hope Engineering Co., connecting the city of Great Falls with the Kevin-Sunburst Field in northern Montana. The line, which will requ're 60 days of continuous work, will be completed this fall if the weather permits. Cost of the line is estimated at $1 500,000, while perhaps $500,000 more will be necessary to complete the gathering and distribution system. This is the largest p pe-line project undertaken in the Northwest territory for some time. The gas will be marketed by the Great Falls Gas Co. The Hope Engineering Co. has opened offices in Great Falls and has several crews in the fie'd. In addition to gas consumption for domestic use, it is expected that the Anaconda Copper Co. w.ll eventually provide a market for gas from the Kevin-Sunburst line. The bulk of the gas will be furnished by wells of the Northern Natural Gas Development Co. in the Kevin-Sunburst Field, but it is reported that the Hope has contracted to take gas from A. W. Patterson and associates, operating in the Sweetgrass Hills, as soon as sufficient vo'ume is developed to warrant a 20-m'le extension of the line.

Bannatyne Wells

The two producers of the Genou Oil & Gas Co. in the Bannatyne Field are being pumped for 12 hours a day and are putting 60 bbls. in the tankage for each pumping period. Other operators are getting under way in the field, two new wells being reported drilling this week. These are the Brittain DeSchon well on Section 34-26-1 and the E liott well on Section 1-25-1. S. C. Ferdig is about ready to spud in on Section 12-25-1. Three more rigs are either up or building, S. C. Ferdig, the Fidelity Oil Co., and Lee Dillon having moved in material this week. A number of other locations are reported.

Seven miles west of the Bannatyne discovery well, O'Neil Brothers are drilling a test well which reports formations conforming with the findings in the Genou well. The O'Ne l wel is located on Section 36-26-2, and at last report was down about 1,400 feet. The Homestake Exploration, a subsidiary of the Texas Pacific Coal & Oil Co., is starting a well on what is known as the Acme Dome, several miles south of the O'Neil location. well will be located on Section 25 29-1. The Acme structure is said to be entirely separate from the Bannatyne.

Pondera Spud

The second test to be dr'lled on the Pondera structure, opened to production by the Montana Pacific well several months ago, has been spudded in by the Whiteside Syndicate on Section 5-27-3. Rig is up for the Claggett Development Co.'s well on Section 8-27-4. A gas franchise has been let to E. B. Emrick and M. S. Darling by the city council of Conrad, Mont., gas to be furnished by the Montana Pacific well.

A second well w ll be dri'led on the Bears Den structure, where gas was found last spring in the discovery well of the Sunburst Oil & Refining Co. The new well will be located on Section 10-37-5, and will also be drilled by the Sunburst Co.

Largest Gas Well

The largest gas well ever reported from the south side of the Kevin-Sunburst Field was completed by the Northern Natural Gas Development Co. last week. The well was rated as a 6,000,000-foot well when the sand was first tapped, but a test showed a production of 19,500,000 feet. The well is known as No. 1 Edwards, located on Section 30 33-1, and has a gas pressure of 380 pounds.

The Homestake Exploration Co.'s No. 8 Howling, reported in last week, flowed half an hour after a shot and reports a 1,200-foot stand of oil in the hole. The Adams Oil Co.'s No. 3 Zachor on Section 20 35-1 was shot and swabbed and will make a fair producer.

The Elite Oil Co. drilled its No. 1 Adams on Section 20-34-1 to a depth of 3,500 feet, and is now plugging back to shoot a showing reported in the Devonian at 2,400 feet. If commercial production is not developed by the shot, the hole will be abandoned. This is another of the wells started in this area after the completion of the National Oil Co.'s No. 1 Adams (Radigan-Hungerford), and like the others failed to find production in the Ellis-Madison contact or in the lime. Developments in this part of the field have proved very disappo nting.

ROCKY MOUNTAIN PRODUCTION
Runs From the Fields

Wyoming	
Salt Creek	32,870
Teapot	740
Big Muddy	2,390
Grass Creek	2,630
Elk Basin	1,030
Greybull	15
Dutton Creek	40
Notches	210
Rock River	2,750
Rex Lake	130
Lance Creek	650
LaBarge	450
Mule Creek	650
Poison Spider	990
Osage	290
Lander	390
Pilot Butte	110
Ferris	100
Byron	70
Lost Soldier	2,850
Simpson Ridge	110
Montana	
Cat Creek	2,080
Lake Basin	240
Kevin Sunburst	11,500
Colorado	
Florence	931
Moffat	1,667
For. Collins	2,756
Walden	0
Iles Dome	490
Rangely	100
Tow Creek	700
Boulder	25
New Mexico	
Rattlesnake	297
Hogback	680
Cap Rock	104
Artesia	1,322
Table Mesa	6
Total	72,957

EXPLAINS PRINCIPLES OF SIMPLIFICATION

(Continued from Page 57)

plied through the collective action of all the elements in an industry, with the cooperation of the division of simplified

LESTER H. KEIM
Rig Irons.

practice, to eliminate needless variety in sizes, dimensions and other immaterial differences of commodities. With all elements in accord as to just what constitutes excessive and uneconomic diversity, it is possible to gain desirable benefits.

Acceptable Results

By means of conferences and voluntary action acceptable results have been obtained in many fields. Surveys are made, by committees appointed by industry itself, and these surveys serve as bases for tentative recommendations which in turn are modified and approved by the rest of the industry before being made effective. In this manner distributors and consumers are in position to act with the manufacturers in drafting a simplified practice recommendation which is acceptable to a true cross section of the industry.

Since this co-operative service was inaugurated over 75 simplified practice recommendations have been made effective by the industries and trades concerned. The reduction in variety, according to the nature of the commodity, has been as low as 4 per cent and as high as 98 per cent and averaging around 70 per cent. Among these eliminations of needless variety 32

J. J. FLANAGAN
Rig Irons.

apply to products of iron and steel and other metals; 14 to lumber, paper, and other products derived from wood; 23 to clay, cement, glass, and other products of a mineral nature; 5 to textiles; and 3 others to commercial documents such as invoice forms, warehouse receipts and checks.

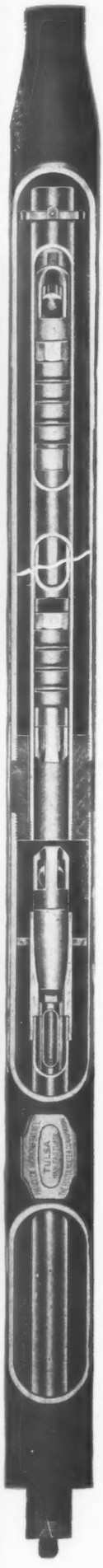
The annual value of manufactured goods affected by these simplifications is well over $2,500,000,000. In eight typical cases leaders in the fields covered

G. H. BOULES
Belting.

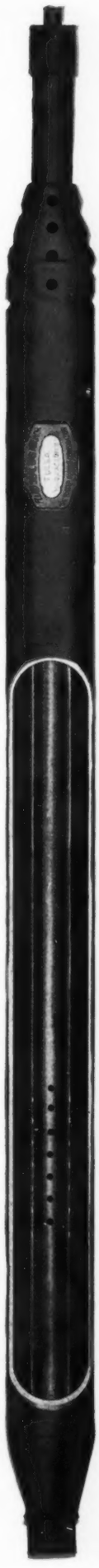
have estimated potential annual savings from simplifications that total $233,400,000. A more general estimate places the savings at $600,000,000 annually.

Value of Adherence

The value of any standard depends first of all upon a general knowledge of its existence, and second, upon the degree of adherence it enjoys. Therefore it is desirable that there be available some means of measuring that adherence. Steps may then be taken to further disseminate information regarding the stand-



The HANCOCK WORKING BARREL



will effect a 50 to 90% saving in pulling expenses, and is uniformly and substantially constructed of the best materials obtainable. It affords a minimum parts replacement expense.

Production superintendents, farm bosses, pumpers and roustabouts, are extended a special invitation to visit our warehouse and see these barrels, while in Tulsa for the Petroleum Exposition.

THE FOSTER-HOEFER CORPORATION

Office and Warehouse: 1087 N. Owasso St.,

Tulsa, Okla.

WORKING BARREL

GAS ANCHOR

Hancock WORKING BARREL

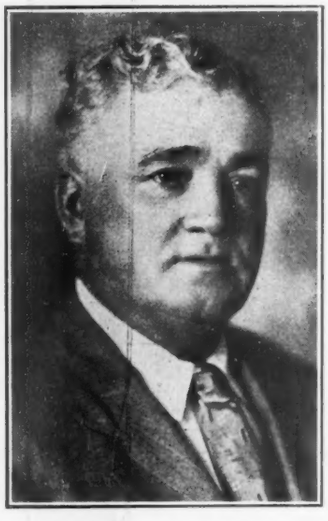
ard, or else modifications may be made in the standard to more nearly approach current needs and conditions. The most important feature of the regular procedure of the division of simplified practice is concerned with a periodic audit of each and every effective recommendation. This is accomplished through the resurveys which are made by the respective standing committees that are appointed by industry at the time of the drafting of the original simplification programs.

In consequence of this method of auditing it has been observed that a wider recognition is being given to established recommendations, and that an increasing degree of adherence is being accorded

ROBERT N. BURNETT
Belting.

them by manufacturers, distributors, and consumers. Also, the soundness of the principles of simplification is reflected in the number of requests for co-operation that the division of simplified practice is receiving from industry.

Adherence to simplified practice recommendations by their original acceptors has been swelled by the adoption of the recommendation by many who were outside the original concerns represented. Typical of increasing adherence, one report evidenced the fact that prior to simplification, in 1921. 80 per cent pro-



WILLIAM WRIGHT
Cable Drilling Tool Joints.

duction was in 11 of the 66 cataloged varieties, whereas in 1924 this same industry had 88 per cent in a simplified list of five varieties. Similarly, another industry reported that 84 per cent of their production fell within the range of the simplified list of sizes.

The petroleum industry has been particularly alert in establishing technical

Standardization Will Have Value in Large Economies in Expenses

By R. A. SPERRY

Vice President and General Manager, General Petroleum Corp. of California

We are very much impressed with the results already secured by the American Petroleum Institute in its standardization work. We know that this work will have its value in substantial economies in future department and operating expenses. These economies result from the application of the three basic principles which the standardization committees of the American Petroleum Institute have kept uppermost in mind—interchangeability, improved material and reduced inventories, and realization of these economies will be materially accelerated if all companies will specify 'A. P. I. Standard" when ordering new material and equipment.

General Petroleum Corp. wishes to congratulate the standardization organization of the American Petroleum Institute on the excellence of the work performed and to express its appreciation of the great service rendered the petroleum industry.

standards for its own guidance, and it has manifested its interest in many of the effective simplified practice recommendations, particularly those concerned with construction and building materials, tools and mechanical equipment. Such interest is appreciated by the manufacturing groups which depend upon the support of the ultimate consumers for the success of their efforts to eliminate avoidable waste at the source.

That which is fabricated by one industry is consumed by another industry. Each has its own problem of keeping down costs. If all industries will reciprocate in the matter of supporting each other's constructive attempts to eliminate avoidable waste, no one will suffer and the economic health of business will be improved.

T. D. DAVIES
Oil Country Tubular Goods.

LICENSEES AUTHORIZED TO USE A. P. I. STANDARD MONOGRAM

The official list of manufacturers authorized to use the A.P.I. monogram on various materials follows:

CABLE DRILLING TOOL JOINTS

Acme Fishing Tool Co., Parkersburg, W. Va.
Asiatic Petroleum Co. (N. Y.), Ltd., New York, N. Y.
Baash-Ross Tool Co., Los Angeles, Calif.
Bovaird & Seyfang Co., Bradford, Pa.
Bridgeport Machine Co., Wichita, Kans.
Carter Oil Co., Parkersburg, W. Va.
Charles Phillips Tool Co., Mannington, W. Va.
Cree & Co., Cross Plains, Tex.
Crotty & Co., Parkersburg, W. Va.
General Petroleum Corp. of California, Los Angeles, Calif.
Hinderliter Tool Co., Tulsa, Okla.
Huasteca Petroleum Co., New York City.
International Petroleum Co., Ltd., Toronto, Canada.
Kesselman & Co., Parkersburg, W. Va.
Keystone Driller Co., Beaver Falls, Pa.
Larkin & Co., Butler, Pa.
Leidecker Tool Co., Marietta, Ohio.
Louden Tool Co., Kittanning, Pa.
Lucey Manufacturing Co., Chattanooga, Tenn.
Magnolia Petroleum Co., Dallas, Tex.
Marland Refining Co., Ponca City, Okla.
Masseth Packer & Machine Co., Butler, Pa.
McJunkin Supply Co., Charleston, W. Va.
Midland Iron Works, Billings, Mont.
Murray Tool & Supply Co., Cleveland, Ohio.
Murray Tool Co., Eastland, Tex.
Nederlandsche Koloniale Pet. Maatschappij, New York City.
O. C. S. Manufacturing Co., Coffeyville, Kans.
Ohio Oil Co., Findlay, Ohio.
Oil Well Engineering Co., Ltd., New York City.
Oil Well Engineering Co., Ltd., Cheadle Heath, England.
Oil Well Supply Co., Pittsburgh, Pa.
Oklahoma Iron Works, Tulsa, Okla.
Regan Forge & Engine Co., San Pedro, Calif.
Sanderson-Cyclone Drill Co., Orrville, Ohio.
Spang & Co., Butler, Pa.
Standard Oil Co. of Bolivia, New York City.
Standard Oil Co. of California, San Francisco, Calif.
Standard Oil Co. of Venezuela, New York City.
Star Drilling Machine Co., Akron, Ohio.
Titusville Forge Co., Titusville, Pa.
The Eureka Tool Co., Drumright, Okla.
The Guiberson Corp., Dallas, Tex.
Union Tool Co., Carnegie, Pa.
United Iron Works, Inc., Joplin, Mo.
Vickers, Ltd., New York City.
Wilson & Willard Manufacturing Co., Los Angeles, Calif.
Taft-Peirce Manufacturing Co., Woonsocket, R. I.

TUBULAR GOODS

Following is a list of companies authorized to use the A.P.I. monogram on oil country tubular goods in accordance with A.P.I. Standards No. 5-a: "Pipe Specifications."
American Seamless Tube Corp., Los Angeles, Calif.
Babcock & Wilcox Tube Co., Beaver Falls, Pa.
Central Tube Co., Pittsburgh, Pa.
A. M. Byers Co., Pittsburgh, Pa.
The British Mannesmann Tube Co., Ltd., London, England.
Greenfield Tap & Die Corp., Greenfield, Mass. (Gauges.)
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa. (Couplings.)
Jones & Laughlin Steel Corp., Woodlawn, Pa.
National Tube Co., Pittsburgh, Pa.
Pittsburgh Steel Products Co., Pittsburgh, Pa.
Pratt & Whitney Co., Hartford, Conn. (Gauges.)
Reading Iron Co., Reading, Pa.
Republic Iron & Steel Co., Youngstown, Ohio.
The Scottish Tube Co., Ltd., Glasgow, Scotland.
A. O. Smith Corp., Milwaukee, Wis. (Couplings.)
South Chester Tube Co., Chester, Pa.
Spang, Chalfant & Co., Inc., Pittsburgh, Pa.
Standard Seamless Tube Co., Ambridge, Pa.
Ste' Ame d'Escaut et Meuse, at Anzin (Nord), France.
Ste' Ame des Usines a'Tubes de la Meuse, at Femalle-Haute, Belgium.
Stewarts & Lloyds, Ltd., 41 Oswald St., Glasgow, Scotland.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, Ohio.
Mannesmannrohren-Werke, Dusseldorf, Germany.
Mannesmannrohren-Werke, A. G., Komotau, Czechoslovakia.
Monongahela Tube Co., Pittsburgh, Pa.
American Steel Export Co., New York City.
Vereinigte Stahlwerke, Dusseldorf, Germany.
Acieries & Usines a Tubes, De La Sarre, Paris, France.
Vikovice Mines, Steel & Iron Works Corp., Czechoslovakia.
Allegheny Steel Co., Brackenridge, Pa.
The Taft-Peirce Manufacturing Co., Woonsocket, R. I.

RIG IRONS

Oil Well Supply Co., 215 Water Street, Pittsburgh, Pa.
Oklahoma Iron Works, Tulsa, Okla.
The National Supply Co., Toledo, Ohio.
The Parkersburg Rig & Reel Co., Parkersburg, W. Va.
Lucey Manufacturing Corp., Nineteenth and Grove Streets, Chattanooga, Tenn.
The Western Iron & Foundry, Second and Santa Fe Avenues, Wichita, Kans.
United Iron Works, Ridge Arcade Building, Kansas City, Mo.
Oil Well Engineering Co., Ltd., Cheadle Heath, Stockport, England.
Vickers, Ltd., Vickers House, Broadway, Westminster, London, S. W., England
Union Tool Co., Torrance, Calif.
Marion Machine, Foundry & Supply Co., Marion, Ind.

TRANSMISSION CHAINS

Link Belt Co., Indianapolis, Ind.
Chain Belt Co., Milwaukee, Wis.
The Baldwin Chain & Manufacturing Co., Worcester, Mass.
The Union Chain & Manufacturing Co., Sandusky, Ohio.
Union Tool Co., Torrance, Calif.
Hans Renold, Ltd., Manchester, England.

H. A. MELAT
Cable Drilling Tool Joints.

Vickers, Ltd., 1123 Equitable Building, 393 Seventh Avenue, New York City.

BOILERS

Oil Well Supply Co., 215 Water Street, Pittsburgh, Pa.
General Petroleum Corp. of California, Higgins Building, Los Angeles, Calif.
Republic Supply Co. of California, 2122 East Seventh Street, Los Angeles, Calif.
Baker Iron Works, Los Angeles, Calif.

GLENVER McCONNELL
Belting.

Llewellyn Iron Works, Los Angeles, Calif.
Donovan Boiler Works, Inc., Parkersburg, W. Va.
Farrar & Trefts, Buffalo, N. Y.
The Broderick Co., Muncie, Ind.
Standard Boiler & Steel Works, Los Angeles, Calif.

LINE SHAFTS

Union Tool Co., Torrance, Calif.

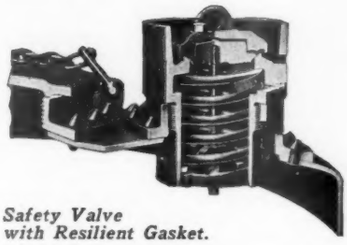
SYNTHETIC FUEL START

The manufacture of synthetic oil fuel by the German Dye & Chemical Trust will begin in a few days, it was reported recently in Berlin. Low production cost is said to permit competition with natural oil at home and abroad.

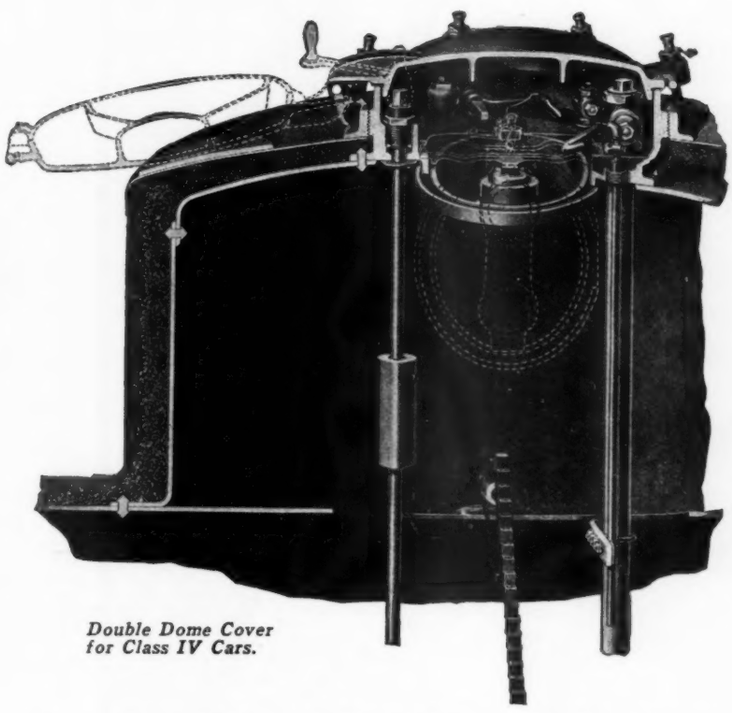
New!

Tank Car Improvements

for preventing outage losses



Safety Valve with Resilient Gasket.



Double Dome Cover for Class IV Cars.

THE larger picture shows the new "Car Foundry" double dome cover for Class IV tank cars. The outer cover swings open, to the position shown by the dotted lines, for access to the control fittings. The inner cover swings downward, as shown by the lower dotted lines, to provide a manhole for entrance into the tank. The control fittings are protected by the outer cover against damage from the outside and are completely isolated from the lading by the inner cover. Plate-glass peep holes in the inner cover make it possible to gauge the contents of the tank without removing the cover, a new step rule gauge being provided for this purpose. It is also possible to sample the contents without disturbing the inner cover. The lading can be unloaded by air pressure or discharged through the bottom outlet. A vacuum relief valve, located in the control chamber, also permits siphoning the lading. The tank can be loaded through the siphoning pipe and the progress of the loading observed through the peep holes. Loading, unloading, gauging and sampling can be done without exposure of the lading to the atmosphere. In this way large evaporation losses are avoided and the dangers of an open tank completely eliminated.

The smaller picture shows the new "Car Foundry" safety valve for Class III and Class IV tank cars carrying gasoline or other volatile products. This device retains all the features of the standard A.R.A. valve, and adds a new resilient gasket, impervious to gasoline, which prevents leakage up to practically the popping point. The gasket prevents large losses during transit. It can be removed and replaced, if for any reason this should be necessary, while the tank is under pressure, as removal of the gasket still leaves the metal-to-metal seal of the standard A.R.A. device. The only new parts required for application to existing A.R.A. valves are the new valve stem, clapper, and gasket.

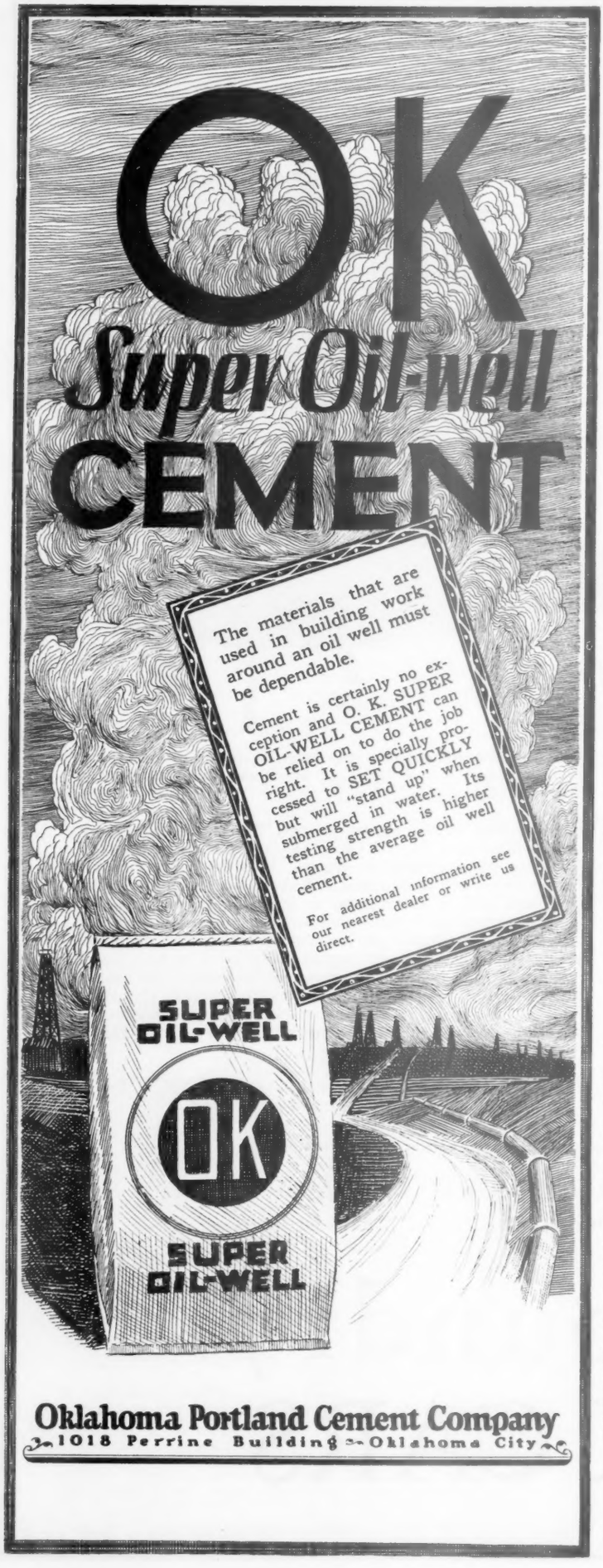
Illustrated literature on these and other new "Car Foundry" features will be forwarded on request.

Booth 50, Oklahoma Building, International Petroleum Exposition.

AMERICAN CAR AND FOUNDRY COMPANY

NEW YORK CHICAGO ST. LOUIS

"Car Foundry" TANK CARS


OK
Super Oil-well
CEMENT
The materials that are used in building work around an oil well must be dependable.
Cement is certainly no exception and O. K. SUPER OIL-WELL CEMENT can be relied on to do the job right. It is specially processed to SET QUICKLY but will "stand up" when submerged in water. Its testing strength is higher than the average oil well cement.
For additional information see our nearest dealer or write us direct.
SUPER OIL-WELL
OK
SUPER OIL-WELL
Oklahoma Portland Cement Company
1018 Perrine Building Oklahoma City

FIVE YEARS' PROGRESS OF STANDARDIZATION

(Continued from Page 113)

with the others; and that in consequence (if he is an oil producer) he must keep a large stock on hand and is obliged to wait a long time and pay more whenever one of the parts of the manufactured article requires renewal. The idea so prevalent in the last century among manufacturers that each must have a different sort of thread for his screws, nuts and bolts, from anybody else, so that the consumer would be compelled to buy repairs from him at a high price, has been thoroughly discredited, and the manufacturer who would support such practice today could not long remain in business. We now look at questions of uniformity from a different angle, and I hink all have come to recognize the fact that standardization is for the benefit of the manufacturer no less than for that of the user.

The real establishment of standards, as we understand it, is not a matter for individual action, nor merely a suppression of the unnecessary; indeed, it may be, and in our branch of industry is, by no means always a matter of simplification, but is rather improvement—improvement by collective action, sometimes leading to simplification, at others to increased complexity, but always to improvement and to uniformity—that we must have in view.

The establishment of a standard is not a project to be lightly embarked on by only a part of those concerned; for once adopted it is with difficulty changed for a new and better one. Where such an establishment is undertaken piecemeal it may be found that standards set up by different groups acting independently may conflict with one another, and the different standards may have proceeded so far that they are difficult to eradicate.

It is the great service of the simplification bureau of the Department of Commerce to bring together interested groups which could not otherwise be brought together, because it has the informaton to be found in no other organization.

It has been suggested that this institute should have a committee permanently and actually engaged in bringing together its members to adopt standards, and that such committee should be constantly in touch and in co-operation with the American Engineering Standards Committee and the Bureau of Simplified Practice and with related organizations, so that the standards along the lines recommended, as well as in other fields not here touched upon, may be worked out and formally adopted.

New Specifications Needed

J. Edgar Pew, said:

Unquestionably four facts have been established by our investigations:

1. That the production of oil is from increasingly deeper wells, and that this increase in depth of wells will probably continue.

2. That there is no regular stock or size of casing adapted for these greater depths, as because of the necessity of using heavier and stronger casing, the present stock sizes cannot be used by simply increasing the weight; there being no room, or clearance, to permit the necessary increase in weight.

3. That the present deep drilling and the prospective future deeper drilling demand casing of entirely new specifications, and that as soon as possible this should be provided.

4. That in making up these new specifications, both for economy of manufacture, and for economy in using, a specification should be arrived at which will meet the demands of all the fields, and under all conditions, a single "O.D." thread and taper for the same sized hole, changing the weight only, and from the inside, will permit the use of the same tools, fittings, etc.

Primitive Conditions

H. J. Lockhart, chairman of the voluntary committee of manufacturers, said:

Those of you who are familiar with the early drilling in Pennsylvania know that in design at least, rig irons used today are practically the same as were used in 1860 to 1870. Then there were as many designs as there were manufacturers. The same state of affairs exists today. The producer uses what he gets but it is to be doubted, indeed, whether he gets what is best for him. Yet he takes it because he is not a manufacturer or a designer, but a producer, busy with his own problems, and with very little time or inclination to force the manufacturer into giving him maximum value for his money.

Glaring Inefficiency

S. A. Guiberson said:

The interchange of ideas and information is rapidly resulting in the elimination of many difficulties heretofore encountered and today we are gathered here as oil men representing every phase of the industry, in an honest endeavor to help each other in working out the solution of problems that add expense and worry and often bring disaster in the production of oil, with the object of eliminating unnecessary and excessive investment in equipment and time in drilling, thus saving the ultimate consumer of the products of our business the added costs of inefficiency.

One of the most glaring points of inefficiency, brought out by the study now being given, is the utter lack of standardization in oil well equipment. While tool manufacturers have for years realized this lack, having been constantly called upon to manufacture many various standards in the same tool of the same size, the producer is just beginning to grasp the full significance of this practice. The tremendous drop in inventory value of equipment carried by many operators last year served to accentuate this realization and from every field we find a growing demand for standardization. The operator is not alone responsible for the wide variation in equipment; various manufacturers have also had much to do with it. The problem we now face however is not to fix responsibility for the wide variation in standards now prevalent, but to intelligently study and correct the evils which exist.

Standardization of Tool Joints

So much has been said upon the question of general standardization that it is difficult to add anything more. In fact, there is no need for more argument in its favor. It is not now a question of should we standardize tools, casing and equipment, but how can this best be accomplished with the least loss and inconvenience to the operator and manufacturer. The standardization of tool joints is the subject assigned me and it is with much pleasure that I discuss this subject for, as a manufacturer and an operator, I have been brought face to face with the crying necessity of drastic action being taken along this line, both as to joints for standard or cable tools and joints for rotary drilling.

Steps Already Taken

In regard to standard tools, this Institute at its last meeting authorized our beloved friend, the late Louis C. Sands, then director of the Supply Company Division, to call a meeting of the manufacturers of cable tools in order to ascertain whether the standardization of cable tool joints could not be effected. On June 21, 1922, such a meeting was called in Pittsburgh, at which certain standards for threads on pin and box were agreed upon and a committee of seven members was appointed to go further into this subject.

The greatest step of all, however, was recently taken when the standardization committee of the Mid-Continent Oil & Gas Association met in Tulsa on November 14, 1922, with leading operators, their engineers, and representatives of manufacturers of tubular goods and there agreed on certain standard sizes for oil well casing. The adoption by oil operators as a whole, of the standards agreed upon at that meeting would be the greatest single advance that could possibly be made toward standardization of oil well equipment, because the sizes of casing used in drilling wells determine in large measure the sizes of tools and other equipment used in connection therewith. Especially is this true as regards tool joints, since the inside diameter of casing, in all sizes up to 10 inch, is the factor

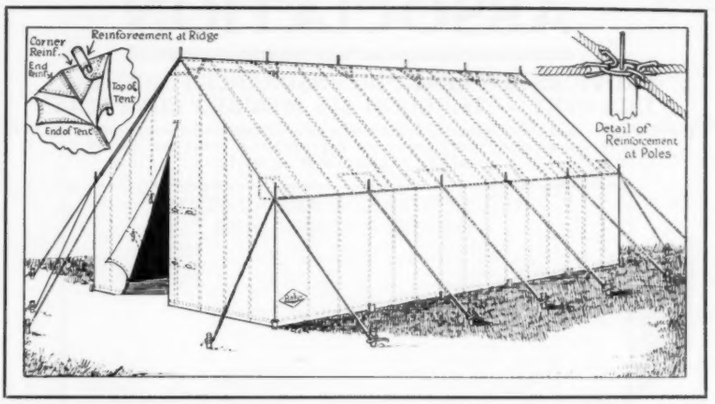
(Continued on Page 324)

TABLE 3—A.P.I. OUTSIDE DIAMETER PLAIN END PIPE LINE PIPE (LIGHT WEIGHT)

(Continued from Page 260)

External Diameter	Thickness	Weight per foot Plain Ends	Steel Lap Weld	Test Pressures: O. H. Iron Lap Weld	Test Pressures: Wrought Iron Lap Weld	Working Pressures Lapweld Steel Pipe: Fiber Stress 12,500 lbs. sq. inch Safety Factor of 4	Working Pressures Lapweld Steel Pipe: Fiber Stress 10,000 lbs. sq. inch Safety Factor of 5	Working Pressures Lapweld Steel Pipe: Fiber Stress 8,333 lbs. sq. inch Safety factor of 6
4-1/2	.142	6.609	1000	800	700	788	631	525
	.165	7.639	1100	1000	800	916	733	611
	.1875	8.635	1200	1100	900	1041	833	694
	.205	9.403	1400	1200	1000	1138	911	759
4-3/4	.145	7.131	900	800	700	763	610	508
	.193	9.393	1200	1100	900	1015	812	677
	.250	12.015	1600	1400	1200	1315	1052	847
	.3125	14.810	2000	1800	1500	1644	1315	1096
	.334	15.752	2100	1800	1600	1757	1406	1171
5	.152	7.870	900	800	700	760	608	506
	.165	8.520	1000	850	750	825	660	550
	.1875	9.637	1100	1000	850	937	750	625
	.203	10.400	1200	1100	900	1015	812	676
	.220	11.231	1400	1200	1000	1100	880	733
	.253	12.826	1500	1300	1100	1265	1012	843
	.296	14.870	1800	1500	1300	1480	1184	986
	.3125	15.644	1800	1600	1400	1562	1250	1041
	.355	17.611	2100	1800	1600	1775	1420	1183
5-1/4	.153	8.328	900	750	650	728	582	485
	.182	9.851	1050	900	750	866	693	577
	.241	12.892	1400	1200	1000	1147	918	765
	.301	15.909	1700	1500	1300	1433	1146	955
	.3125	16.479	1800	1600	1400	1488	1190	992
5-1/2	.154	8.792	850	750	650	700	559	466
	.1875	10.638	1000	900	800	852	681	568
	.228	12.837	1200	1100	900	1036	829	690
	.250	14.017	1400	1200	1000	1136	909	757
	.304	16.870	1700	1400	1200	1381	1105	921
	.3125	17.313	1700	1500	1300	1420	1136	946
	.361	19.813	2000	1700	1500	1640	1312	1093
5-9/16	.1875	10.764	1000	900	750	842	674	561
6	.164	10.222	850	700	600	683	546	455
	.180	11.188	900	800	700	750	600	500
	.190	11.789	950	800	700	791	633	527
	.21875	13.506	1100	1000	800	911	729	607
	.224	13.818	1100	1000	800	923	745	622
	.238	14.646	1200	1100	900	991	793	661
	.250	15.352	1300	1100	1000	1041	833	694
	.275	16.814	1350	1200	1000	1145	916	763
	.324	19.641	1600	1400	1200	1350	1080	900
	.359	21.628	1800	1600	1400	1495	1196	997
6-5/8	.169	11.652	750	700	600	637	510	425
	.185	12.724	850	750	650	698	558	465
	.21875	14.966	1000	900	750	825	660	550
	.238	16.234	1100	1000	800	898	718	598
	.245	16.694	1100	1000	800	924	739	616
	.259	17.609	1200	1000	900	977	781	651
7	.174	12.685	750	650	550	621	497	414
	.1875	13.642	800	700	600	669	535	446
	.21875	15.842	1000	800	700	781	625	520
	.231	16.699	1000	850	750	825	660	550
	.250	18.022	1100	900	800	892	714	595
	.272	19.544	1200	1000	850	971	777	647
	.28125	20.181	1200	1100	900	1004	803	669
	.3000	21.467	1300	1100	1000	1071	857	714
	.332	23.643	1400	1200	1000	1185	948	790
	.362	25.663	1600	1400	1200	1292	1034	861
	.393	27.731	1700	1500	1300	1403	1122	935
	.423	29.712	1800	1600	1400	1510	1208	1007
8	.186	15.522	700	600	550	581	465	387
	.21875	18.179	800	700	600	683	546	455
	.236	19.569	900	800	700	737	590	491
	.250	20.692	1000	800	700	781	625	520
	.28125	23.185	1100	900	800	878	703	585
	.307	25.223	1200	1000	900	959	767	639
	.3125	25.557	1200	1000	900	976	781	651
8-5/8	.188	16.940	700	600	500	544	435	363
	.217	19.486	800	700	600	628	503	419
	.228	21.318	900	700	600	689	551	459
	.250	22.361	900	750	650	724	579	483
	.264	23.574	900	800	700	765	612	510
9	.196	18.429	650	600	500	544	435	362
	.21875	20.515	750	650	550	607	486	405
	.238	22.271	800	700	600	661	528	440
	.250	23.362	800	700	600	694	555	462
	.28125	26.189	900	800	700	781	625	520
	.300	27.875	1000	900	750	833	666	555
	.356	32.777	1200	1000	900	986	788	657
	.402	36.914	1300	1200	1000	1116	893	744
	.426	38.922	1400	1200	1100	1180	944	787
	.484	44.020	1600	1400	1200	1344	1075	896
10	.209	21.855	600	550	500	522	418	348
	.21875	22.851	700	600	500	546	437	364
	.238	24.813	750	650	550	595	476	396
	.250	26.032	750	650	550	625	500	416
	.270	28.057	800	700	600	675	540	450
	.283	29.369	900	750	650	707	566	471
	.308	31.881	1000	800	700	770	616	513
	.3125	32.332	1000	800	700	781	625	520
	.340	35.077	1100	900	800	850	680	566
10-3/4	.220	24.741	600	550	450	511	409	341
	.250	28.035	700	600	500	581	465	387
11	.224	25.780	600	550	450	509	407	339
	.250	28.702	700	600	500	568	454	378
	.28125	32.196	800	700	600	639	511	426
	.3125	35.670	900	750	650	710	568	473
	.340	38.709	900	800	700	772	618	515
11-3/4	.375	45.557	950	850	700	797	638	531
	.435	52.568	1100	950	800	925	740	617
12	.243	30.512	600	550	450	506	405	337
	.250	31.372	600	550	450	520	416	347
	.28125	35.200	700	600	550	585	468	390
	.308	38.460	800	700	600	641	513	427
	.320	39.918	800	700	600	666	533	444
	.34375	42.793	900	750	650	716	572	477
	.375	46.558	900	800	700	781	625	520
12-3/4	.250	33.375	600	500	450	490	392	326
	.259	34.552	600	550	450	507	406	338
	.28125	37.453	700	600	500	551	441	367
	.3125	41.510	750	650	550	612	490	408
13	.250	34.043	600	500	450	480	384	320
	.259	35.243	600	550	450	498	398	332
	.281	38.171	700	600	500	540	432	360
	.320	43.335	800	650	550	615	492	410
	.340	45.971	800	700	600	653	523	435
	.359	48.467	900	700	600	690	552	460
	.390	52.523	1000	800	700	750	600	500
14	.250	36.713	550	450	400	446	357	297
	.276	40.454	600	500	450	492	394	328
	.284	41.602	600	550	450	507	405	338
	.310	45.325	700	600	500	553	442	369
	.328	47.894	700	600	550	585	468	390
	.34375	50.136	750	650	550	613	491	409
15	.250	39.383	500	450	400	416	333	277
	.291	45.714	600	500	450	485	388	323

"If it's Canvas we have it---"



Special Contractor's Tent for Oil Field Use

Constructed to withstand hard usage. Heavily reenforced at all points of strain—three thicknesses of canvas at center poles and corner wall poles, two thicknesses at other poles (see upper left corner illustration).

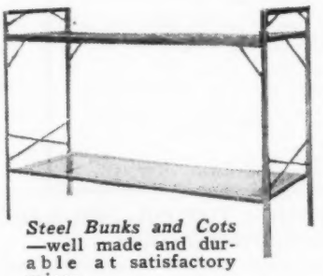
Roped at ridge, eaves, gables and *every third seam* between. Ropes sewed to special rope seam attachment—avoiding needle holes in top. Special ring and link attachment (see upper right corner illustration) at all pole holes takes wearing strain off ropes—adding to life and strength of tent. Double guys at corners and end guys at ridges give unusual stability.

Made regularly of Baker Brand 29 inch, 12 ounce, white duck--or any material desired. All seams double-stitched. Overlapping flap door at each end has double set snaps and rings. Size of tent, 16x35 feet—5-foot wall regularly. Flys roped and reenforced same as tent.

Write, wire or phone for sample materials and special price!

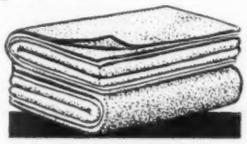
[We make tents of all kinds and sizes—wall tents, circus tents, stable tents, living tents, dining tents, etc. Descriptions and prices on request.]

CANVAS GOODS OF ALL KINDS
Derrick Covers -- Truck Covers
Canvas Covers for Cement -- "Paulins"
for All Purposes -- Cot Pads



Steel Bunks and Cots—well made and durable at satisfactory prices.

Any kind of Canvas Equipment made to order. Write for quotations on your particular needs. Or tell us what you want, and we will figure out your needs and quote prices.



Blankets—at prices that will interest you.

Baker-Lockwood
Mfg. Company, Inc.
Kansas City, Mo.
Makers of Canvas Equipment for Over 57 Years

7387

THE OIL INSURANCE ASSOCIATION

PROVIDES FOR REAL FIRE INSURANCE FOR THE OIL INDUSTRY — THROUGH ITS MEMBER COMPANIES

The Oil Insurance Association is in its ninth year of successful operation, with 100% performance record testifying to the dependability, thrift and speedy and complete satisfaction of its service.

OIL INSURANCE ASSOCIATION MEMBER COMPANIES

Aetna Insurance Co., Hartford, Conn.
Alliance Insurance Co., Philadelphia, Pa.
Allied Underwriters Agency, Hong Kong
American Insurance Co., Newark, N. J.
American Alliance Ins. Co., New York, N. Y.
American Central Insurance Co., St. Louis, Mo.
American Eagle Fire Ins. Co., New York, N. Y.
Automobile Insurance Co., Hartford, Conn.
Ben Franklin Underwriters, Pittsburgh, Pa.
Boston Insurance Co., Boston, Mass.
Caledonian Insurance Co., Edinburg, Scotland
California Insurance Co., San Francisco, Calif.
Camden Fire Insurance Association, Camden, N. J.
Carolina Insurance Co., Wilmington, N. C.
Central States Fire Ins. Co., Wichita, Kans.
Citizens Insurance Co., St. Louis, Mo.
City of New York Insurance Co., New York, N. Y.
Columbia Insurance Co., Jersey City, N. J.
Commerce Insurance Co., Glens Falls, N. Y.
Commercial Union Assurance Co., London, Eng.
Commercial Union Fire Ins. Co., New York, N. Y.
Commonwealth Insurance Co., New York, N. Y.
Concordia Fire Insurance Co., Milwaukee, Wis.
Connecticut Fire Ins. Co., Hartford, Conn.
Constitution Underwriters, Springfield, Mass.
Continental Insurance Co., New York, N. Y.
County Fire Insurance Co., Manchester, N. H.
Eagle Star & British Dom. Ins. Co., Ltd., London, Eng.
East & West Insurance Co., New Haven, Conn.
Federal Union Insurance Co., Chicago, Ill.
Fidelity-Phenix Fire Ins. Co., New York, N. Y.
Fire & Marine Underwriters, Hartford, Conn.
Fireman's Fund Ins. Co., San Francisco, Calif.
Firemens Insurance Co., Newark, N. J.
Firemens Underwriters, Newark, N. J.
Franklin Fire Insurance Co., Philadelphia, Pa.
Girard Fire & Marine Ins. Co., Philadelphia, Pa.
Girard Underwriters, Philadelphia, Pa.
Glens Falls Insurance Co., Glens Falls, N. Y.
Great American Ins. Co., New York, N. Y.
Hanover Fire Insurance Co., New York, N. Y.
Harmonia Fire Insurance Co., Buffalo, N. Y.
Hartford Fire Insurance Co., Hartford, Conn.
Home Fire & Marine Ins. Co., San Francisco, Cal.
Home Insurance Co., New York, N. Y.
Hudson Insurance Co., New York, N. Y.
Imperial Assurance Co., New York, N. Y.
Insurance Co. of North America, Philadelphia, Pa.
Insurance Co. of State of Pennsylvania, Philadelphia, Pa.
Jersey Fire Underwriters, Newark, N. J.
Liverpool & London & Globe Ins. Co., Liverpool, Eng.
Mechanics Insurance Co., Philadelphia, Pa.
Mechanics Underwriters, Philadelphia, Pa.
Mercantile Insurance Co., New York, N. Y.
National Ben Franklin Fire Ins. Co., Pittsburgh, Pa.
National Fire Insurance Co., Hartford, Conn.
National Liberty Ins. Co. of America, New York, N. Y.
National Security Fire Ins. Co., Omaha, Neb.
Newark Fire Insurance Co., Newark, N. J.
New Hampshire Fire Ins. Co., Manchester, N. H.
New York Underwriters Ins. Co., New York, N. Y.
Niagara Fire Ins. Co., New York, N. Y.
North British & Mercantile Ins. Co., London, Eng.
Norwich Union Fire Ins. Society, Norwich, Eng.
Occidental Underwriters, San Francisco, Calif.
Old Colony Ins. Co., Boston, Mass.
Palatine Insurance Co., London, Eng.
Patriotic Insurance Co. of America, New York, N. Y.
Pennsylvania Fire Ins. Co., Philadelphia, Pa.
Philadelphia Fire & Marine Ins. Co., Philadelphia, Pa.
Phoenix Assurance Co., London, Eng.
Phoenix Insurance Co., Hartford, Conn.
Providence Washington Ins. Co., Providence, R. I.
Queen Insurance Co., New York, N. Y.
Reliance Insurance Co., Philadelphia, Pa.
Rochester Dept. of Great American, New York, N. Y.
Royal Exchange Assurance Co., London, Eng.
Royal Insurance Co., Ltd., Liverpool, Eng.
Scotch Underwriters, Edinburg, Scotland
Scottish Union & National Ins. Co., Edinburg, Scotland
Security Insurance Co., New Haven, Conn.
Sentinel Fire Insurance Co., Springfield, Mass.
Springfield Fire & Marine Ins. Co., Springfield, Mass.
St. Paul Fire & Marine Ins. Co., St. Paul, Minn.
Star Insurance Co. of America, New York, N. Y.
Sun Insurance Office, London, Eng.
Svea Fire & Life Ins. Co Gothenburg, Sweden.
Superior Fire Ins. Co., Pittsburgh, Pa.
Travelers Fire Insurance Co., Hartford, Conn.
Union Assurance Society, London, Eng.
Union Insurance Society of Canton, Hong Kong
United Firemen's Insurance Co., Philadelphia, Pa.
Urbaine Fire Ins. Co., Paris, France
Westchester Fire Ins. Co., New York, N. Y.
World Fire & Marine Ins. Co., Hartford, Conn.

AMONG THE PURPOSES FOR WHICH THE OIL INSURANCE ASSOCIATON WAS ORGANIZED ARE:

To enable oil operators to secure sufficient dependable insurance to adequately protect their interests.

To furnish property holders and those controlling oil business expert engineering and inspection service, so methods of insuring this class may be standardized, and efficient fire protective devices installed and properly maintained, thereby stabilizing the business to the point which will enable insurance companies generally to accept the class at fair cost and under equitable policy rates.

To make available the most business-like insurance arrangement for all oil companies.

Complete details of the Oil Insurance Association may be obtained from your insurance agent or broker.

OIL INSURANCE ASSOCIATION
H. M. Carmichael, Mgr.
209 W. JACKSON BLVD., CHICAGO

TABLE 3—A.P.I. OUTSIDE DIAMETER PLAIN END PIPE LINE PIPE (LIGHT WEIGHT

External Diameter	Thickness	Weight per foot Plain Ends	Test Pressures: Steel Lap Weld	Test Pressures: O. H. Iron Lap Weld	Test Pressures: Wrought Iron Lap Weld	Working Pressures Lapweld Steel Pipe: Fiber Stress 2,500 lbs. sq. inch Safety Factor of 4	Working Pressures Lapweld Steel Pipe: Fiber Stress 10,000 lbs. sq. inch Safety Factor of 5	Working Pressures Lapweld Steel Pipe: Fiber S'ress [illegible]
	.320	50.171	650	550	500	533	426	
	.34375	53.807	700	600	500	572	458	
16	.250	42.053	450	400	350	390	312	
	.302	50.632	550	500	400	471	377	
	.3125	52.357	600	500	450	488	390	
	.34375	57.478	650	550	500	537	429	
17	.3125	55.695	550	500	400	459	367	
	.340	60.496	600	550	450	500	400	
	.34375	61.160	600	550	450	505	404	
	.375	66.584	650	600	500	551	441	
18	.3125	59.032	500	450	400	434	347	
	.34375	64.821	550	500	450	477	381	
	.375	70.589	600	550	500	520	416	
20	.375	78.599	600	500	450	468	375	
22	.4375	100.752	600	500	450	497	397	
	.46875	107.792	600	550	500	532	426	
	.500	114.811	650	600	500	568	454	
24	.4375	116.703	550	500	400	455	364	
	.46875	117.805	550	500	450	488	391	
	.500	125.491	600	550	450	520	416	

†To obtain the working pressure for other factors of safety, multiply the pressure shown in this column by 6 and divide by the safety fac.or desired.

WIRE LINES AND CORDAGE A. P. I. SPECIFICATIONS

(Continued from Page 132)

be much less than the strength of the rope.

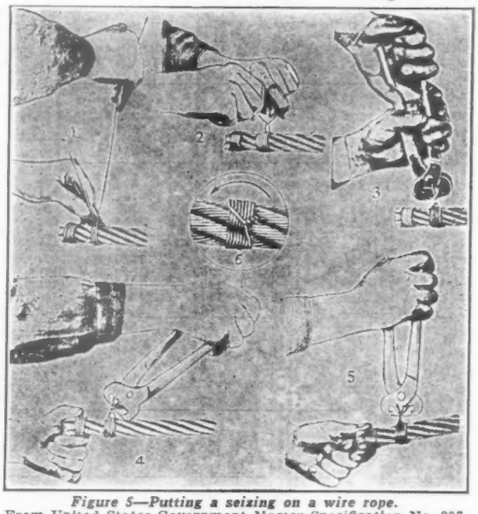


Figure 5—Putting a seizing on a wire rope.
From United States Government Master Specification No. 297

(1) Wind the seizing wire on the rope by hand, keeping the coils together and considerable tension on the wire. (2) Twist the ends of the wire together counterlockwise by hand so that the twisted portion of the wires is near the middle of the seizing. (3) Using "Carew" cutters, tighten the twist just enough to take up the slack. Do not try to tighten the seizing by twisting. (4) Tighten the seizing by prying the twist away from the axis of the rope with the cutters. (5) Tighten the twist again as in (3). Repeat (4) and (5) as often as is necessary to make the seizing tight. Cut off the ends of the wires and pound the twist flat against the rope. (6) The appearance of the finished seizing.

SECTION 6
Packing and Marking

19. Reels.

19-a. Finished wire rope, when so required, shall be shipped on round head, substantial, wooden reels; reels shall preferably have a round arbor ho'e of 5 inches in diameter for drilling lines, casing lines and sand line. When reel is full of rope, there shall be a clearance of not less than 2 inches between the full reel and the outside diameter of the flange.

19-b. The manufacturer shall properly serve the outer end of rope so that the required 10-foot sample can be cut out for preservation by the purchaser for test purposes, as described in paragraph 22-c.

20. Marking of reels.

20-a. The following data shall be plainly marked on the face of the reel: Name of manufacturer, reel number, length and diameter of line, construction and type, and A.P.I. grade of rope.

SECTION 7
Type of Lines

21-a. Cable tool drilling lines shall be three-fourths inch, seven-eighths inch, 1-inch and 1⅛-inch diameter, lengths to vary in multiples of 500 feet.

21-b. Strand fabrication may b[e] 6 by 7, 6 by 8, Warrington, Seale, Fill[er] or one size w're. However, the arrang[e]ment of the different size wires must b[e] uniform and according to a regular sym[-]metrical plan throughout.

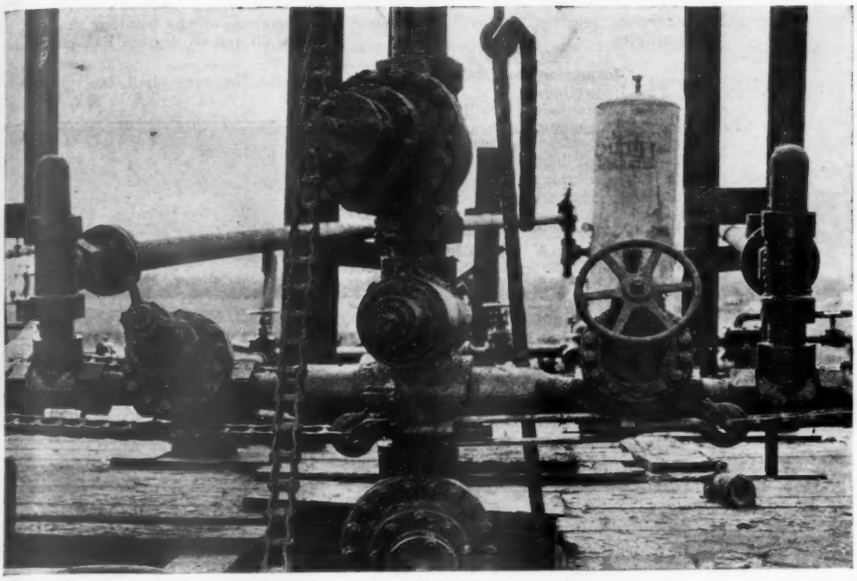
21-c. Warrington construction is t[o] be made in one operation, consisting [of] six strands of 19 wires to the strand[;] the outside of each strand shall be [of] large and small diameter wires, laid [al]ternately. There are three diameters [of] wire in the strand.

21-d. Seale construction is to be ma[de] in one operation, consisting of six strand[s] of 19 wires to the strand; the outsi[de] wires to be nine in number of one diam[-]eter around nine smaller wires; the ce[n]ter wire to be of a larger diameter. Ther[e] are three diameters of wire in the strand.

21-e. Filler wire construction, some[-]times called "one size wire construction," is to be made in one operation of s[ix] strands of 19 wires to the strand; all [of] wires, except the center wire, to be [of] approximately the same size; the cent[er] wire to be slightly larger. The six fill[er] wires are used to support the structur[e] and are, therefore, not considered as com[-]ponent wires in the rope in so far [as] strength is concerned.

21-f. Rotary drilling lines or casi[ng] lines shall be three-fourths inch, seve[n] eighths inch, 1 inch and 1⅛ inches, lengt[hs] to vary in multiples of 250 feet.

21-g. Sand lines shall be 6 by 7 co[n]struction and shall be three-eighths inc[h] one-half inch, nine-sixteenths inch a[nd]



C.I.W. Blowout Preventer Manifold "Hook-up."

Drill Through It—

—and when high-pressure gas pockets are encountered, quickly clamp the rams securely around drill stem and save costly drilling equipment.

Use It in Manifold—

—so that all natural pressure may be conserved and well kept under complete control at all times. Production can be made either above or below Preventer without danger of leakage.

The Best "Blowout Insurance" You Can Buy for Your Well, is a

C. I. W. Blowout Preventer

COMPARED WITH INSURANCE, C.I.W. Blowout Preventer costs but a fraction of an insurance policy—yet it "pays off" promptly, reliably, and SAVES your well besides.

—When unexpected gas pockets are encountered in drilling, this tool (controlled outside the derrick floor) SAVES your costly drilling equipment. Patented packing holds the tighter under higher pressures.

—When used in the well manifold (by substituting our Preventer for the ordinary cross) wells can be brought in without loss of oil or dissipation of natural pressures. Drill stem (with which liner was set) can remain suspended in the hole on Preventer rams, and eliminate the dangerous operation of removing it UNDER PRESSURE.

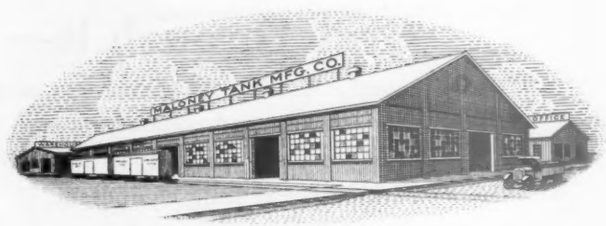
—Gives complete control of well at all times.
—Tested and guaranteed to hold 2000 pounds hydrostatic pressure.
—Designed without gaskets, lead, babbitts or bolts to give way under pressure.
—So simple that it IS "fool proof."

Write for Descriptive Literature and Prices

Cameron Iron Works

Houston, Texas

KEYSTONE COPPER STEEL



VISIT THE MALONEY PLANT

while in Tulsa at the Exposition. We would like to show both customers and prospects our modern equipment in actual operation.

Also See Us At

Booth 85—

Texas Building

International

Petroleum Exposition

MALONEY TANK MFG. COMPANY
108 North Peoria
TULSA, OKLA.

MADE OF KEYSTONE COPPER STEEL

MALONEY PATENTED BOLTED COPPER-STEEL TANKS

MADE OF KEYSTONE COPPER STEEL

MALONEY TANKS

five-eighths inch diameter. Lengths to vary in multip'es of 500 feet.

21-h. Rotary bailing l nes shall be nine-sixteenths inch, five-eighths inch and three-fourths inch, shall be 6 by 19 construction, lengths to vary in 500-foot multiples.

SECTION 8
Inspection and Rejection

22. Inspection.

22-a. Manufacturer will on request of purchaser, conduct tests as called for in this spec fication on reasonable notice from the purchaser, during which tests the manufacturer will afford opportunity to the purchaser's representative to be present.

22-b. Manufacturer delivering wire rope bearing an A.P.I. grade designation warrants the material to comply with these specifications. The use of the A.P.I. monogram is not permitted on del.veries under these tentative specifications.

22-c It is recommended that wherever possible, the purchaser upon receipt, shall test all new rope purchased in accordance w th these specifications. It is recognized, after a rope is put in use and it fails to render satisfactory service, that it is impracticable to retest such used rope. It is therefore recommended that the purchaser preserve at least one test specimen of all new rope purchased. Length of specimen to be at least 10 feet, properly identified by reel number, etc. Care should be taken that no damage will resu t by storage of specimen.

22-d. If a purchaser rece'ving rope purchased on these specifications does not make physical test before putting rope into use, or does not preserve in proper manner the sample as outlined, recourse on the manufacturer shall be considered waived.

SECTION 9
Galvanized Wire Guy Strand

23. Single galvanized wire guy strand.

23-a. This shall consist of a strand made up of seven twisted galvanized w'res of the following minimum breaking stresses per strand:

TABLE 10

Size—	Minimum Breaking Stresses Pounds per Square Inch
¼ inch	1,900
5/16 inch	3,200
⅜ inch	4,250
7/16 inch	5,700
½ inch	7,400

23-b. No test of galvanizing shall be appl'ed to single guy wire strand.

24. Double or extra galvanized wire guy strand.

24-a. This shall consist of a strand made up of seven twisted galvanized wires of the following minimum breaking stresses per strand:

TABLE 11

Size—	Minimum Breaking Stresses Pounds per Square Inch
¼ inch	1,900
5/16 inch	3,200
⅜ inch	4,250
7/16 inch	5,700
½ inch	7,400

24-b. Galvanized wire composing the above strand shall be uniformly and continuously coated with zinc which adheres firmly to the wire. That zinc shall be applied in a molten condition by what is designated commercially as "hot process galvanizing." Using the Preece test, the wire sha'l not show the appearance of bright, adherent copper, indicating exposed iron, for the number of immersions shown in the following table:

Wires taken from ¼-inch strand	3 immersions
Wires taken from strands 5/16-inch to ½-inch diameter, inclusive	4 immersions

25. Test of galvan'zing.

25-a. Specimens. Specimens, at least 6 inches long, for testing the thickness of the zinc coating shall be cut from the wire before the rope is made. Not less than three specimens shall be cut from each size of wire to be used in the rope.

25-b. Cleaning. The specimens shall be cleaned before testing, using cotton waste w'th carbon tetrachloride, benzine, or turpentine. A brush shall not be used. The specimens sha'l then be rinsed thoroughly in clear water and wiped dry, using clean cotton waste.

25-c. Preece method. Each specimen shall be immersed in a standard solution of copper sulphate for one minute, immediately washed thoroughly in water, and wiped dry. Th.s process shall be repeated. If, after the last immersion and washing there is a bright metallic copper deposit on the specimen indicating that the zinc has been removed, the wire represented by specimen shall be rejected. The temperature of the solution shall be between 60 and 65 degrees Fahrenheit during test.

25-d. No wire shall be rejected be-

R. L. DAUGHERTY
Wire Lines and Manila Cordage.

cause a copper depos't appeared within 1 inch of the end of a test specimen representing that coil of wire.

25-e. Copper solution: Preparation. The standard solution of copper sulphate shall be made by dissolving 36 parts, by weight, of commercial copper sulphate crystals in 100 parts, by weight, of cold water. To neutralize any free acid chemically pure cupric oxide (CuO) shall be added in excess, which will be indicated by the oxide appearing on the bottom of the container. The neutralized solution shall be filtered through filter paper before using. It shall have a specific gravity of 1.186 at 65 degrees Fahrenheit at the beginning of each test. If the specific gravity is too high, clean water should be added; if too low, a filtered solution of a higher specific gravity should be added.

E. W. GOESER
Wire Lines and Manila Cordage.

25-f. Use. The copper solution shall be contained in a glass vessel at least 2 inches inside diameter and filled to a depth of at least 4 inches before immersing the specimens. Not more than seven specimens shall be immersed simultaneously, and they shall be separated to allow the solution to act on all the immersed surface of the wires.

25-g. Color samples. Each day that tests of the galvanizing are made, standard color samples of the bright metallic copper deposits shall be made, with which the test specimens shall be compared. These color samples cut from the wire to be tested shall be immersed in concentrated hydrochloric acid until all zinc is removed. The sample shall be immediately washed and wiped dry and immersed in the standard copper solution for one minute, removed, washed and wiped dry.

FRANK M. BREWSTER
Petroleum Reclamation Co., Bradford, Pa.
Wire Lines and Manila Cordage.

H. C. MILLER
Wire Lines and Manila Cordage.

APPENDIX A.

Recommended Practice for the Use and Preservation of Wire Rope

Field Use

A-1. Socketing line into socket, clean wires and socket with acid and use zinc. Zinc must not be heated too hot. The rope is to be parallel with the axis of the socket for a distance of at least 5 feet. (See Section 5.)

A-2. All wire lines to give maximum life should be kept continually lubricated.

A-3. Wire line thimbles and clamps, when used as rope end attachments, should provide sufficient bearing so as not to put excessive strain at any point.

A-4. Recommend that field men use a proper apparatus when removing line from reel to drums. Reel apparatus should have a brake so that line can be tightly spooled on drums.

A-5. Do not strike wire line with hammer, derrick hatchets or crowbar or cause any unnecessary nicks or bruises on wire.

A-6. String blocks to give minimum wear against sides of grooves in sheaves and observe that all sheaves are in proper alignment and are true in bearings.

A-7. Keep line tightly and evenly wound on winding drums. Excessive speeds when blocks are running up light do much injury to wire rope.

A-8. Keep wire line grooves in sheaves to proper form by proper testing and refinishing, if necessary.

A-9. Hardened metal, such as manganese or special alloy steel, heat-treated, will best serve for grooves in sheaves. Grooves to be made to proper design and to be smoothly finished concentric with the bore or shaft.

A-10. All rotating sheaves should exert a minimum turning effort and should be properly lubricated.

A-11. Sheaves should be used only for the size of line for which they are grooved.

A-12. After stringing new wire rope on blocks and sheaves, run with light load for short time to set rope to working conditions. Use lubricant while so doing.

M. B. SWEENEY
Wire Lines and Manila Cordage.

C. F. WALL
Wire Lines and Manila Cordage.

Refer to Figure 6 for the best method of attaching wire rope clips.

A-13. Sudden, severe stresses are injurious to wire rope and should be reduced to minimum.

A-14. Before cutting a wire rope, see that both ends are securely seized with wire each side of cut. (See Figure 5.)

A-15. Experience has proved that fatigue and wear increase with speed; economy results from increasing load

BUCK

The *One*

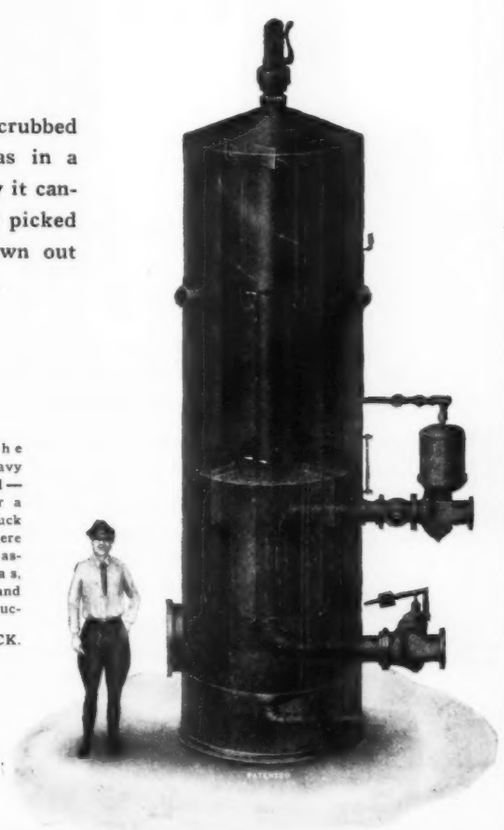
Oil and Gas Separator

that uses *Heavy Gassers Force* to scrub out spraying oil.

The Heavy Gasser spraying oil is a hard one to handle—enormous energy is required to make a clean separation of the oil spray from the gas. BUCK Separators utilize this energy and control the violent flow of gas to effect a clean separation.

The principle is centrifugal—the force of the gas flow creates a strong centrifugal effect—compounded.

The oil is scrubbed from the gas in a way whereby it cannot again be picked up and blown out with the gas.



WHATEVER the situation: — Heavy Gasser—Bad Sand—AirGas Lift — or a pumping well, Buck Separators are there with the results, assuring clean gas, clear settled oil and a maximum production.

C. P. BUCK.

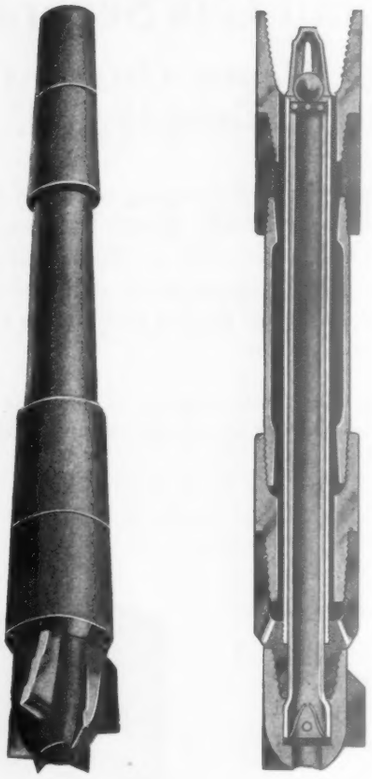
Gustin-Bacon Mfg. Co.

Vacuum Control Division

Kansas City, Mo. **Tulsa, Oklahoma**

THE PERFECTION CORE BARREL

A Dependable Coring Tool



The old adage, "A workman is no better than his tools," holds true in the oil industry.

You can not expect the best cores unless you furnish your Driller with the best coring tool.

Give us your order for a Perfection Core Barrel and run it. If you are not then of the opinion that the Perfection is the best Core Barrel made we will not ask you to buy.

Five sizes of barrels.
Cutter heads 4¼" to 14".

Write for pamphlet and prices.

Manufactured by

OIL CITY IRON WORKS, INC.
SHREVEPORT, LOUISIANA

DISTRIBUTORS:
Wilson Supply Co., Houston, Texas
Bradford Supply Co., Wichita Falls, Texas
Hercules Supply Co., Dallas, Texas

(within the safe limits) and diminishing speed.

A-16. Great care is to be taken to avoid kinks in a wire line.

A-17. Care should be taken that the proper form be maintained in the throat of groove in drilling clamps gripping the rope. Slipping of wire rope through drilling clamps should not be allowed.

A-18. The splicing of wire rope requires considerable skill. The instructions for splicing wire rope are too long to be given here. They will be found in the catalogues of most of the wire rope manufacturers. The sequence of the operation is carefully described and many clear illustrations show the progress of the work in the hands of experienced workmen. These illustrations give, in fact, most of the information which a person would receive by watching the making of a splice by skilled hands.

A-19. Jack up reel of rope as near as practicable to the drum and parallel to it with a direct lead to the drum or crown sheave wherever possible. (See paragraph C-19.)

A-20. If winding rope direct from reel to drum, wind it in the same direction as it comes off from the reel, i. e., wind from the top of reel to top of drum, or from bottom of reel to bottom of drum. This will make the rope wind better and tighter.

A-21. Keep a tight tension on rope while it is being wound on drum.

A-22. Do not use a larger sized rope on sheaves that have been used for a smaller rope unless the sheave grooves are turned out to the larger size, or preferably install a new sheave with the proper size of groove. (See paragraphs A-9 and B-1.)

A-23. Keep wire lines well lubricated with a good grade of lubricant, free from acid or alkali, and one that will penetrate and adhere to the rope. Do not use crude oil or cheap dope that contains chemicals that are injurious to rope and will cause deterioration or brittleness of the wires in the rope.

A-24. If wire line becomes covered with dirt or grit clean it off with a brush. This will save a lot of wear on the line.

A-25. Be sure that the fast sheave in rotary or cable tool work lines up with the center of the winding drum in order to secure the closest possible winding of the rope on the drum, bull and calf wheel shafts.

A-26. When replacing a worn-out rotary line with a new line always wind it upon the drum under tension, using not over eight or ten strands of pipe in the hole. This will break rope in gradually by pulling this length of pipe. Do not operate a new line loosely wound on drum or when lowering pipe into the hole.

A-27. A suitably designed starting wedge integral with the drum or shaft is essential to secure helical winding of the first layer of rope on the winding drum, in addition to the usual precautions for tight winding.

A-28. In rotary cable tool drilling always use sufficient parts of rope to handle the casing or drill pipe. Do not overstrain a rope by using only four parts in the blocks when six should be used. Four parts of rope will handle approximately two-thirds as much load as six parts.

A-29. In rotary drilling when using a four-part line in the casing block the surplus line should be carried on the calf wheel. In the absence of a calf wheel care should be taken to see that the clamps used to fasten the rope for dead ending do not kink, flatten, or crush the line. The use of properly designed clamps (not a U-bolt clip) will prevent this damage.

A-30. Do not use scored, corrugated or worn drums or shafts, as this will cause excessive wear on the line.

A-31. For existing drum conditions a rope speed for hoisting or lowering should never exceed 4,000 feet of rope travel per minute. With larger drums proportionately higher speeds may be used. This speed limitation also applies to cable tool rigs.

APPENDIX B

Suggested Improvements in Design of Oil Field Equipment to Lengthen Life of Wire Rope

B-1. Hardened metal, such as manganese or special alloy steel, heat treated, will best serve for grooves in sheaves. Grooves to be made to proper design and to be smoothly finished concentric with the bore or shaft.

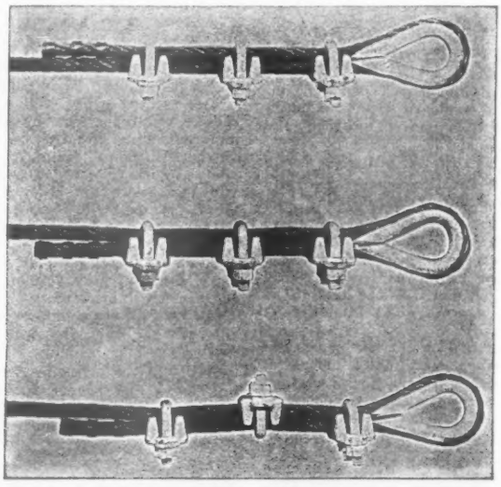


Figure 6—Attaching clips to wire rope.
Above: Correct way to fasten wire ropes with clips. Below: Two wrong ways to use clips for fastening wire rope.
The roddle should be in contact with the long end of the wire rope and the U-bolt in contact with the short end of the loop in the rope.

B-2. All rotating sheaves should exert a minimum turning effort, by the application of bearings, with the minimum amount of friction, preferably antifriction.

B-3. Drum sizes so as to have only as few layers (preferably two) of cable as possible are desirable. Drums having a diameter 20 times the rope should be considered minimum for good practice.

B-4. Sheet of theoretical bending stresses attached shows the importance of large sized sheaves and drums. (See Figure 7.)

B-5. The grooves of drilling and casing line sheaves shall be made for 1-inch rope as standard. The bottom of the groove shall have 150 degree arc of support with a radius of seventeen thirty-seconds inch with a sheave manufacturing tolerance of plus one sixty-fourth minus 0. The depth of the groove shall be 1¾ times the diameter of the rope. The sides of the groove shall be tangent to the ends of the bottom arc. See paragraph B-6 for size of rope other than 1 inch. (See Figure 8.)

(Note: The above is calculated in accordance with the basic formula shown in paragraph B-6).

B-6. The groove for any other size of drilling and casing line is to be specified

ECONOMY!

The Kibele Self Expanding Piston proves its value by its length of life and excellent service.

Seco Liner and Valve Seat Pullers now ready for the market.

Write or Wire for Prices, etc.

Sold by Supply Stores

Mission Sales Company
Esperson Building
Houston, Texas

NOTICE

To users of Casing and Line Pipe

We have recently organized our Tulsa Branch and have likewise added additional machinery to our Madison, Illinois, plant which enables us to look after your requirements in first class line pipe and casing.

Complete stocks are carried at both Tulsa and Madison and your inquiry by wire, phone or letter will be looked after immediately by one of our representatives.

Standard Rail & Steel Company

Main Office
Madison, Illinois
Phone Illinois 1560

Branch Office
New Daniels Bldg.
Tulsa, Okla.
Phone 4-0833

by the purchaser, the radius of the bottom of the groove to be:

$$R = \frac{D+t}{2} + \text{Sheave manufacturing tolerance of } +1/64''—0''.$$

where R=radius of the bottom of the groove, in inches,
D=nominal diameter of line, in inches,
t=specified plus tolerance of line, in inches. (See Table 9.)

The depth of the groove to be $1\frac{3}{4}$ times the nominal diameter of the rope, and to have a 150 degree arc of support.

B-7. The groove for sand line sheaves shall be made for five-eighths inch rope as standard. The bottom of the groove shall have a 150 degree arc of support, with a radius of eleven thirty-seconds inch with a sheave manufacturing tolerance of plus one sixty-fourth inch minus 0. The depth of the groove shall be three times the diameter of the rope. The sides of the groove shall be tangent to the ends of the bottom arc. (See Figure 8.)

(Note: The above is calculated in accordance with the basic formula shown in paragraph B-6, except that the depth of the groove was made three times the diameter of rope.)

B-8. Sheaves having grooves made according to the foregoing specifications should be marked plainly with the size of line for which the sheave is designed.

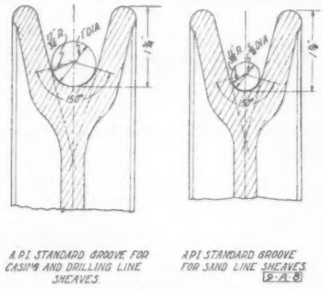


Figure 8.
To the above groove radius may be added a manufacturing tolerance = +1/64"—0".

B-9. It is recommended that the hole in the rope socket and sockets for swivels be five thirty-seconds inch larger than the line to be inserted.

B-10. Combination sheaves for manila and wire lines are not recommended.

B-11. Grooves on rollers of oil savers should be made to the same tolerances as the grooves on the sheaves.

APPENDIX C

Field Troubles and Their Causes

C-1. Lines that are broken square off. Cause—Overstrain, kink, damage, or localized wear weakening one or more strands and loss of elasticity.

C-2. One or more whole strands part- ing. Cause — Overstrain, divider interference or local wear. If overstrain is sudden, it will cause a square-off break. In some cases it will show a necked down condition of wires.

C-3. Undue corroded condition of rope. Cause—Lack of proper lubrication, very bad salt or alkaline water in hole. Periods of idleness between jobs.

C-4. Ropes damaged by careless handling in hauling to wells or location. Cause—Rolling reel over obstructions or dropping from truck or wagon on to any hard material that will result in distorting or damaging rope. The use of chains for lashing, or use of lever against rope instead of flange.

C-5. Ropes damaged by improper socketing. Cause — Improper seizing which allows slack from one or more strands to work back into rope, or poor workmanship in socketing. Frequently shown by being untwisted at socket, loose or drawn.

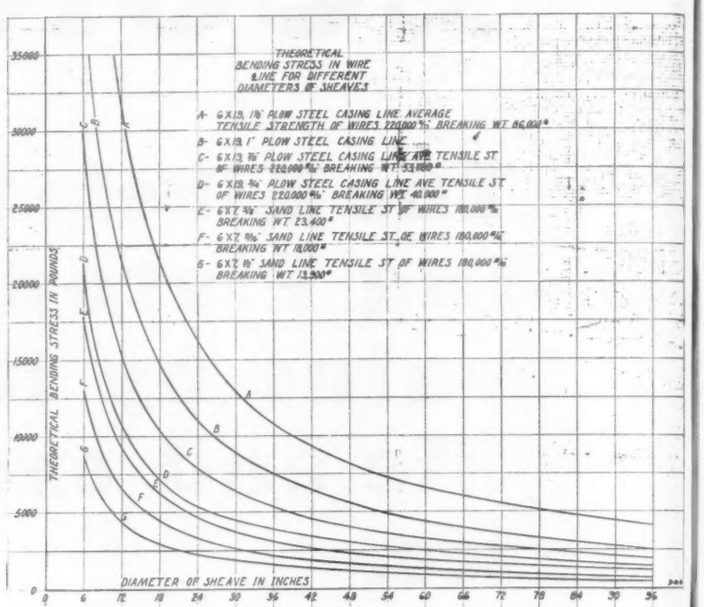

THEORETICAL BENDING STRESS IN WIRE LINE FOR DIFFERENT DIAMETERS OF SHEAVES
A- 6X19, 1⅛" PLOW STEEL CASING LINE AVERAGE TENSILE STRENGTH OF WIRES 220,000 #/□" BREAKING WT 86,000#
B- 6X19, 1" PLOW STEEL CASING LINE
C- 6X19, ⅞" PLOW STEEL CASING LINE AVE TENSILE ST OF WIRES 220,000 #/□" BREAKING WT 53,000#
D- 6X19, ¾" PLOW STEEL CASING LINE AVE TENSILE ST OF WIRES 220,000 #/□" BREAKING WT 40,000"
E- 6X7, ⅝" SAND LINE TENSILE ST OF WIRES 180,000 #/□" BREAKING WT 23,400"
F- 6X7, ½" SAND LINE TENSILE ST OF WIRES 180,000 #/□" BREAKING WT 10,000"
G- 6X7, ⅜" SAND LINE TENSILE ST OF WIRES 180,000 #/□" BREAKING WT 13,500"
THEORETICAL BENDING STRESS IN POUNDS
DIAMETER OF SHEAVE IN INCHES
35000
30000
25000
20000
15000
10000
5000
0
0 6 12 18 24 30 36 42 48 54 60 66 72 78 84 90 96

Figure 7—Relation between diameter of sheave and bending stress in rope.

C-6. Ropes showing kinks, dog legs and other distorted places. Cause—These are all the result of improper handling or installation.

C-7. Ropes damaged by hooking back slack too tightly to girt. Cause—Operation of walking beam causes a bending action on wires at clamp and results in fatigue and cracking of wires, frequently before rope goes down into hole.

C-8. Ropes used on a fishing job. Cause—All such jobs overstrain a rope from the nature of the work.

C-9. Ropes used for swabbing. Cause—This operation usually overloads a rope and service is therefore irregular.

C-10. Ropes showing excessive wear in spots. Cause—Kinks or bends in rope due to improper handling during installation or service, also wear against casing or hard shells or collars in hole.

C-11. Ropes broken starting bits or fighting caves. Cause—Overstrain on rope causing excessive stretch and distortion.

C-12. Spliced lines. Cause—A splice is never as good as a continuous piece of rope and slack is liable to work back and cause irregular wear in splice itself.

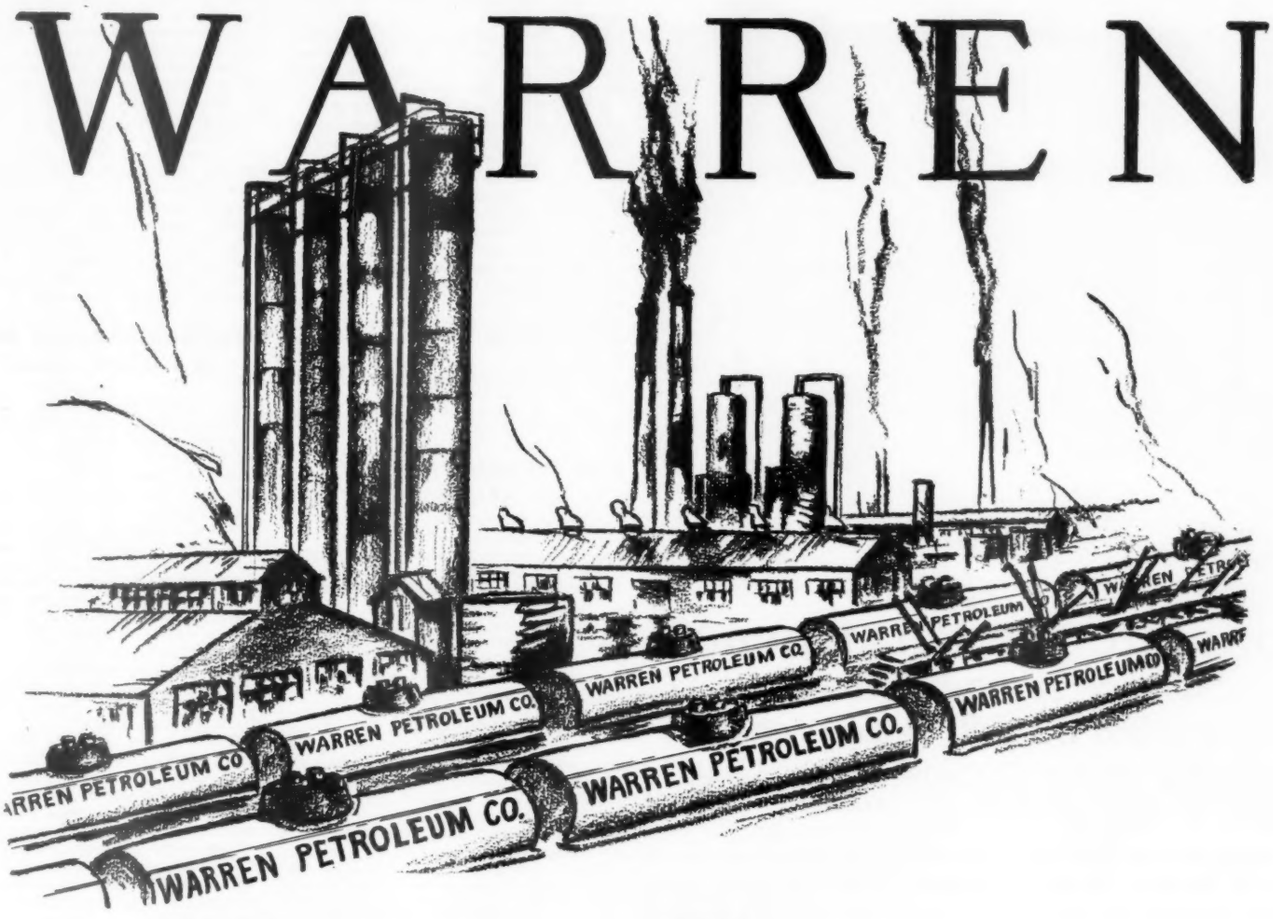
C-13. Injury due to slipping rope through clamps. Cause — Abrasion and broken wires in a straight line. Drawn or loosened strands.

C-14. Ropes damaged by irregular or improper winding on shaft or drum. Cause—Lack of attention when rope is installed, resulting in putting bends into rope.

C-15. Damage due to improperly fitted clamps. Cause—Produces unequal pressure and distortion of wires and rope.

C-16. Ropes operated with sheaves or drums worn out or out of proper alignment. Cause—This results in side wear

WARREN



Natural Gasoline

IN SELLING the entire output of over fifty plants under contract, the Warren Petroleum Company plays the important role of being the largest Natural Gasoline Sales Organization in the country.

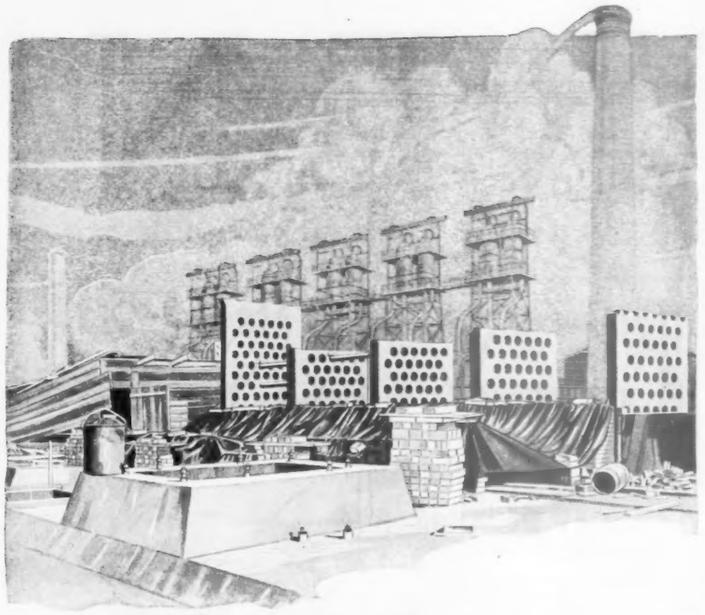
Because of this large output which embraces Oklahoma, Louisiana, Arkansas, Kansas and Texas producing points our position is one which enables the buyer to avail himself of the exact grade from the most advantageous point.

By reason of the above we are able to render a real service in the selection of the proper grade you may require and immediate shipment for rush orders.

WARREN

Petroleum Company

FIRST NATIONAL BANK BLDG., TULSA, OKLAHOMA



"Concrete for Permanence"
where temperatures run as high as 1800 degrees, F.

CONCRETE THAT STANDS HEAT is made of Sil-O-Cel C-3 aggregate and ordinary Portland cement.

This material has long been used for the construction of industrial furnace doors and bases. Some of these units placed in service ten and twelve years ago are still in good condition.

We know of nothing better suited for the insulation of tube plates in pipe stills than this "insulating concrete."

It is lighter than fire clay, and five times as effective at stopping heat penetration. It does not crack or spall. It will withstand temperatures as high as 1800° F. without shrinkage.

It is easily made up right on the job, and rammed into places where block or brick could never be used. Its cost is low.

Mail the coupon for our Engineering Service Bulletin C-115 on Insulating Concrete and a sample of this remarkable material.

SIL-O-CEL

Sil-O-Cel C-3 is a semi-refractory material used as the aggregate in making high temperature "insulating concrete." It should not be confused with Celite for concrete, a light weight powder that is used as a workability agent in structural concrete.

CELITE PRODUCTS COMPANY
11 Broadway, New York — 53 W. Jackson Blvd., Chicago
1320 S. Hope St., Los Angeles — 140 Spear St., San Francisco
(Please address nearest office)

Gentlemen: Please send me your new Engineering Service Bulletin C-115 on "Insulating Concrete," and a sample of C-3 Concrete. I am interested particularly in its use for

.....

Name .....

Address .....

City & State .....

on rope and cutting away of sheave flanges.

C-17. Ropes worn out in service. Cause—Natural wear and deterioration, wires worn down on crowns. Also due to sharp sand and friction against casing.

C-18. Fatigue breaks in wires. Cause—Excessive vibration due to poor drilling conditions, i.e., high speed, rope whipping.

C-19. Spiraling or curling. Cause—Allowing rope to drag or rub over pipe, sill, or any object, during installation or operation. Always use a block with sheave 18 inches in diameter or larger when installing (and tubing block is suitable).

C-20. Ropes showing excessive flattening or crushing. Cause—In rotary drilling the pulling of stuck casings, loose winding on the drum or cross winding. In standard tools the taking off of your storage reel.

C-21. Core-popping. Cause — Hitting fluid with excessive speed.

C-22. Whipping off of line. Cause—Running too loose.

FIVE YEARS' PROGRESS OF STANDARDIZATION

(Continued from Page 314)

which determines the size of a tool joint, either cable or rotary.

Factors Affecting Cable Tool Standardization

The cable tool joint is and always has been the weakest part of a string of tools. Its dimensions have been limited by the diameter of the casing in which it is to be used. (I am speaking now of casing 10 inches or less in diameter.) Therefore a different size string of tools is commonly used inside each different size of casing under 10 inches in diameter.: It is perfectly possible to drill a well with cable tools to a depth of 5,000 feet or more with the use of only three strings of tools (except bits), one for 8 inch and larger casing, one for 6¼ inch and 6⅝-inch casing and one for 4½ or 4¾-inch casing. Instead of three, we find listed in manufacturers' catalogs, some 12 different sizes of tools for Western specifications and 11 different sizes for Eastern specifications, each size being determined by the tool joint it carries. For each size of tools and casing the operator must carry a stock of wrenches, fishing tools, elevators, underreamers and extras of various sorts. A survey of the tool platform of any property, even of moderate size is staggering, while the tool equipment at the central camp of some of our larger companies passes the comprehension of all except the unfortunates who have had to pay for them.

IMPORTANCE OF UNIFORM GAUGING PRACTICE

(Continued from Page 299)

note that it enables all manufacturers to apply the gauges to their work in a standard manner. Similar sheets are provided for use with gauges for other products.

The foregoing brief discussion merely indicates the mass of detail entering into this phase of the standardization program. Many thousands of dollars have already been spent for gauges, and many more will be required. What can we reasonably expect as a return for this very considerable outlay of time and money?

The answer should be fairly obvious to the practical oil man. The expense of delays resulting from failure of drilling or production of tools, all of them depending for satisfactory operation on properly fitting screw threads, can quickly run into thousands of dollars on one well alone. This is particularly true of wells drilling in regions remote from shop facilities and often with inadequate transportation. It is not expected that standardization will eliminate all fishing jobs, but it is reasonable to hope that their occurrence will be reduced and that delays due to misfit parts will become a thing of the past. A further reduction in operating costs can be expected as standardization becomes general, through a reduction in stocks required to adequately serve the trade requirements as the number of styles of a given item subject to demand is reduced. This same condition will tend to reduce manufacturing costs as time goes on through simplifying production schedules and reducing the difficulties of tooling and inspection.

The advantages of standardization are not to be realized overnight, but are none the less real and desirable; the accomplishment of the program rests largely on the workability of the standards which in turn depends in no small degree upon the efficacy of the gauges and gauging systems adopted to maintain them. Close co-operation between manufacturer and operator has produced a specification representing the best thought of the entire industry. Only a continuance of that co-operation will insure the successful application of these standards in the field.

STANDARDIZATION WORK IN PACIFIC COAST AREA

(Continued from Page 126)

is held, at which the subcommittee chairmen report their findings. The main committee reviews and approves the work done, at times making some slight changes. The recommendations as thus approved are passed on to the American Petroleum Institute, through the medium of California committeemen who attend the meetings of the parent organization.

Chester W. Brown continued as chairman of the main committee until 1926, when he was succeeded by C. C. Scharpenberg, of the Standard Oil Co. of California. The personnel of the various subcommittees changes slightly from time to time, but at all times is fully representative of California operating and manufacturing companies.

The Chamber of Mines and Oil is the clearinghouse for all of the standardization work. Its secretary acts as secretary for all of the subcommittees and of the main committee, thus keeping the organization in close touch with the details of the work. All correspondence between California committees, national chairmen and officials of the standardization division of the American Petroleum Institute passes through the Chamber of Mines and Oil. This makes available at all times a complete history of the standardization work. The secretary attends all meetings, acting as general secretary and contact officer for the California committeemen who attend the sessions. It has been customary, at these national meetings, for the California chairmen in attendance to hold informal discussions every morning before the business of the day begins. In this way close touch is kept with developments from day to day and necessary information passed along to the proper channels.

KENTUCKY-TENNESSEE

(Continued from Page 86)

ground. The explosion shook houses for many miles and windows and chimneys in farm houses were shattered.

Week's Work

A summary of the week's work in the Kentucky Field shows 8 completions, 7 producers with an initial of 425 bbls. and 1 dry hole. Compared with the previous week, there were 14 less completions, 9 less producers, 1,071 bbls. less production and 5 less dry holes. The wells were distributed by counties and districts as follows:

County—	Comp.	Oil Wells	Prod.	Dry
Ohio	5	5	330	0
Daviess	2	1	75	1
Barren	1	1	20	0
Total	8	7	425	1
Last week	22	16	1,496	6
Difference	14	9	1,071	5

Pipe Line Runs

According to the four pipe line companies handling crude in the Kentucky Field, that make their monthly reports there was a total of 470,128.84 bbls. handled through the four systems during August. The runs from the eastern division totaled 232,277.87 bbls., for the four weeks of August to August 27. The western division runs totaled 237,850.97 bbls., the first time that the western division has accounted for larger runs than the eastern division by 5 573.10 bbls. Had the remaining days of August

ORGANIZATION OUTLINE OF

The Mid-Continent Oil & Gas Association

A federated non-profit organization devoted to the interests of all branches of the Petroleum Industry in the Southwest

THE GENERAL ASSOCIATION

Office: 505 Cosden Building, Tulsa, Oklahoma.

Finance: Supported by direct voluntary contributions based upon an annual budget.

Scope of Activity: National or general matters not peculiar to any one State but affecting all five States of the Mid-Continent Field and Gulf Coast, such as—

- Federal Taxation
- Federal Legislation
- General Public Relations Work
- Standardization of Lease Contract
- Economic Research
- Co-Operation with Departments of National Government
- Other Matters in which the Operators of the Five States have a common interest.

AFFILIATIONS: Three Local Divisions and The Petroleum Safety Council

The Kansas-Oklahoma Division

Office: 505 Cosden Bldg., Tulsa, Okla.

Finance: Supported by dues of $25.00 per individual member per annum.

Scope of Activity: Matters particularly affecting the industry in Kansas and Oklahoma, such as—

- State Legislation
- State Taxation
- Local Public Relations Work
- Co-Operation with State Departments
- Indian Laws and Regulations
- Conservation Laws and Regulations, Etc.

The Texas Division

Office: 1507 Kirby Bldg., Dallas, Texas.

Finance: Supported by dues of $25.00 per individual member per annum.

Scope of Activity: Matters particularly affecting the Industry in the State of Texas, such as—

- State Legislation
- State Taxation
- Local Public Relations Work
- Educational Work
- Co-Operation with State Departments
- Conservation Laws and Regulations, Etc.

The Louisiana-Arkansas Division

Office: 34-35-36 American National Bank Bldg., Shreveport, La.

Finance: Supported by dues of $25.00 per individual member per annum.

Scope of Activity: Matters particularly affecting the Industry in the States of Louisiana and Arkansas, such as—

- State Legislation
- State Taxation
- Local Public Relations Work
- Co-Operation with State Departments
- Conservation Laws and Regulations, Etc.

This Space Contributed by a Member of the Mid-Continent Oil & Gas Association.

MONROE "TALON"
ROPE SPEARS *and* GRABS

The "Talon" *Grip*

The Harder You Jar the Tighter It Grips

The most effective tools for recovering broken cable ever produced.

All sizes from 2" up will be shown at Booths Nos. 27-28 Oklahoma Building.

Patents applied for

To those who may miss the "Big Show" write for descriptive matter and prices.

Manufactured only by

The Cameron Tool & Supply Company

CAMERON, WEST VIRGINIA

"Use the better tool first"

runs been accounted for in the eastern division, the eastern runs would have been greater. The pipe lines making their monthly reports are the Cumberland Pipe Line Corp., in the eastern division, and in the western division the Illinois Pipe Line Co., Paragon Development Co. and the Stoll Oil Refining Co.

The runs of the Cumberland Pipe Line Co. for August amounted to 232,277.87 bbls. The runs for the week ending August 6, were 57.908 25 bbls.; week ending August 13, 56.461.28 bbls.; week ending August 20, 57.700.52 bbls.; week ending August 27, 60.207.87 bbls.

The Illinois Pipe Line Co. handled through its western Kentucky lines a total of 198 439 42 bbls.; a gain over the July runs of 14,389.74 bbls. The August runs of this company were 105,-717 21 bbls. greater than the January total runs, showing what an increase has been made in production in the western division, which is due to a large extent in the nice wells being found in Ohio and Daviess Counties as well as in Barren and Allen Counties.

The Paragon Development Co.'s runs for August from Barren County amounted to 19,569.19 bbls., and from Cumberland, Monroe and Clinton Counties, 5,-011.21 bbls., or a total of 24.580.40 bbls.

The Stoll Oil Refining Co. runs from Barren County for August amounted to 14.831.15 bbls., and for July were 14,-258.01 bbls., a gain of 573.14 bbls. for August.

The Paragon Development Co. ran during August from Clay County, Tennessee, fields a total of 5.811.94 bbls., and from Pickett County, 980.08 bbls., making this company's total runs from the two states for August of 31 372.42 bbls., a gain over the July runs of 1 836.27 bbls.

Western Division

While the eastern division failed to report any completions during the week, it was up to the western division to make a showing of some kind and it did, although but one large producer was found which was in the Ambrose Pool in Ohio County and one in the Roby Pool in Daviess County, not nearly as productive, with excellent prospects for another good pool in Ohio County in the Sunnydale area.

Ohio County

The best producer of the week was the Creek Drilling Co.'s No. 8 on the Fannie Lake 100 acres, at the north edge of the Ambrose Pool. This well set a string of 641 feet of casing, found sand from 641-699 feet and went to a total depth of 704 feet and shot with 190 quarts, resulting in an initial production of 200 bbls. Nos. 9 and 10, same farm, are under way.

Interest shifted from one extreme to another in Ohio and Daviess Counties since the last report. First came the bringing in of a nice well in Daviess County; then the excitement shifted over into Ohio County in what is known as the Sunnydale Field, where some tests are showing nice commercial production.

In the Sunnydale Field, southeast from the Ambrose Pool, some interesting things are happening and leases are commanding much higher prices than at any period since development work started in the Tri-County Field some years ago. Buying of leases and production has become quite an industry in this section. Competitive bidding on leases has brought the price up to such an extent that the old timers are standing from under, it is said.

The Sunnydale Oil & Gas Co., a company of Evansville, Ind., and Hartford, the county seat of Ohio County, Kentucky, capitalists, has struck what is showing for a nice producer on the Renfrew lease in the extreme southeastern tip of the field, near the little hamlet of Sunnydale, southeast of the Ambrose Pool, in Ohio County. This is the fourth well to be drilled by the company, the other three being comparatively small producers, one of which is a gas well. The Renfrew well struck its oil at a very shallow depth of 392 feet, and is estimated at around 25 bbls. Most of the wells in this area run from 550 to 650 feet, and some even deeper. Twelve feet of sand was found in the Renfrew well, and the oil rapidly rose to the surface. The well will not be shot for a period, owing to there being no pipe line connections, although a line will be extended there at once. This company is drilling a wildcat test a couple of miles south of Hartford in the same county and in altoge her untested territory. The Creek Drilling Co. is drilling a well on the Feemster farm, same area, while the Sunnydale Oil & Gas Co.'s well on the Wilson lease, is reported good for 5 bbls.

Another well drilled in the extreme lower tip of the present field is that of Taylor Yewell and others on the Bob Hamilton farm, directly on the bank of Rough River and the most southerly well of the proven field. This well is flowing its oil and said to show around from 40 to 50 bbls., but will be put on the pump as soon as pipe line connections are made.

Midkiff Pool

In the Midkiff Pool, the White Plains Oil & Gas Co. set a string of 415 feet of casing in No. 3 on the Urey Howard 60 acres, found sand from 428-48 feet and shot with 60 quarts. The well's initial production is reported at 50 bbls. Same company's No. 3, on the Ivo Howard 214-acre farm, same pool, was dry in the Jett sand and drilling to the Barlow sand.

C. E. Daugherty, according to advices, has sold a one-sixteenth interest in his Cora Wells lease, in the Ambrose Pool, where Nos. 1 and 2 showed initial production of 250 and and 225 bbls., for a consideration of $16 000, to Dr. M. G. Buckner and Chester LaRue. Mr. Daugherty is said to still maintain a one-eighth in the lease.

Advice is that another big deal is brewing between one of the big oil companies and a local holding company in Ohio County, which has for many years controlled the mineral rights on a large body of land in the Ambrose Pool and its surroundings. The deal, however, has not as yet been closed, according to those on the inside.

Indications are for a fairly good well in practically wildcat territory and drilled by James C. Ellis on the Bartlett farm, south of the Ambrose Pool, near Clear Run Creek, which may open up a new extension to the big pool.

Westward from the Ambrose Pool, C. E. Daugherty is reported to have a nice showing at a test on the Hill Rhodes farm, near Union Grove Church, which indicates an addition to the pool to the westward as suggested by Mr. Jillson, Kentucky state geologist, in his late report of the Tri-County Field.

James C. Ellis is reported to have a nice showing in his well on the Mount Moriah Church lot, south of the Ambrose Pool. Mr. Bales, who is interested in the well with Mr. Ellis, announces that its showing is for around 50 bbls. It has not at this time been put on the pump.

Daviess County

The Petroleum Exploration Co.'s No. 4 well, 200 feet from the south line and 1,000 feet from the east line of the Frank F. Coomes 78 acres, in the Roby Pool, is credited with a first 24 hours' production of 75 bbls.

Leeper Oil Co. has pulled out and abandoned No. 2 on the W. L. Barnett 50 acres, in the same area.

Barren County

In the Lecta Pool, of the Glasgow Field, in Barren County, Hunt, Leach and Mitchell's No. 25, on the Vance G. Taylor farm, is said to show for 20 bbls.

MICHIGAN FIELDS

(Continued from Page 89)

to find enough oil to account for the effect the 'smeller' reported."

Other Completions

The Dundee Oil & Gas Co.'s No. 1, on the Cuthbertson property, on the east side of Bay Road, one half mile north of the Shattuck Road, got top of Berea at 1,828 feet and went to a total depth of 1,846 feet, where the production is estimated at 20 bbls. initially.

The Sun Oil Co.'s No. 3, on the Pere Marquette right of way, south of Davenport Street, is said to show for 25 bbls.

after a 60-quart shot. Sand was topped at 1,798 feet and drilled 15 feet in the sand.

The Sun Oil Co.'s No. 1, on the Edwin Robbinnolt farm, in Elba Township, Gratiot County, in the Ashley area, is reported a dry hole. Berea in this well was found at 2,108 feet and there was but 6 feet of Berea sand at a total depth of 2,114 feet. The well was then sent to a lower depth and shot in a lime formation at 2,597 feet, but considered too light to pump and was abandoned.

There are several wells about ready for completion in the Saginaw Field, among which are: Sun Oil Co.'s No. 2 Pere Marquette right of way; No. 3 George Kuck farm, and No. 7 John Stelzreide farm; all Sun Oil Co. wells. Morley Brothers' No. 2 Morley property, near the foot of Janes Avenue; Jack Hendricks and others' No. 2 Campau property, west bank of river between the Michigan Central and Grand Trunk tracks; Fordney Petroleum Co.'s No. 1, at the southeast corner of Durand and Cronk Streets, and the Fordney well near Owosso, in Shiawassee County.

Field Notes

The Standard Oil Co. of Indiana is now storing some of the Saginaw Field crude in its storage tanks recently completed at Milwaukee, just north of Saginaw and on the site where the Standard is constructing a refining plant.

The wildcat well drilling on the W. J. Smith farm, Section 20, Birch Run Township, Saginaw County, and southeast of Saginaw, reported no showing of oil at between 8 and 10 feet in the Berea. This well is being drilled by Detroit parties.

W. J. Sovereign and V. M. Vorhees are drilling a wildcat well near Sterling, in Arenac County, northwest of Standish and far removed from any other known test drilled, being far to the north of Bay City.

Wicks Brothers have a derrick in for No. 3, on their property, on the east side of the Saginaw River, near North Water Street.

Jack Hendricks and others have made a location for No. 3 on the Campau property, in Saginaw.

E. W. Miller is drilling a wildcat on the O. K. Bailey farm, Section 19, Swan Creek Township, Saginaw County, about 2 miles north of St. Charles.

E. M. Treat & Co., old-time operators, are starting a test near Henderson, north of Owosso, in the northwestern part of Shiawassee County, and not far from the Ashley Field of Gratiot County, the location being between developments in both counties.

EASTERN FIELDS

(Continued from Page 89)

Calhoun Oil & Gas Co.'s test on the Edwin Starcher farm is a duster in the Big Injun sand. In Sheridan district, Martin Crawley has a gasser at a test on the Mrs. E. D. Hainer farm.

Godfrey L. Cabot has completed in the Big Injun sand his test on the John Smith farm in Geary district, Roane County, about 1,200 feet west of Noble Beattie's second test on the Fred Smith farm, and is a 3-bbl. pumper.

On Chipps Run, West Union district, Doddridge County, the Clifton Oil & Gas Co. drilled its test on the Thomas Smith farm, through the Squaw sand, to a total depth of 2,575 feet. It is a duster in all sands. In Murphy district, Ritchie County, the Cairo Oil & Gas Co. has a gasser in the Maxon sand at a test on the Boggess farm.

Drilling Test Wells

Two miles south of Clarksburg district, Harrison County, Dorsey Cork has made a location for a test on the D. W. Mitchell farm. In Sardis district, same county, Hugh S. Burke and others have a rig up on the Jesse Hannah heirs' farm. In Hackers Creek district, Lewis County, the Carnegie Natural Gas Co. is rigging up on the E. B. Jackson farm. In McClelland district, Doddridge County, the Manufacturers Light & Heat Co. has started to drill on the G. W. and A. Farr farm. In Reedy district, Roane County, the Heck Oil Co. has started to drill on the F. D. Vandale farm.

In Center district, Gilmer County, the Carnegie Natural Gas Co. has started to drill a test on the Loyd Westfall farm. In Otter district, Braxton County, J. F. Pauley has shut down for water at his test on the Henry Clowser farm. In Geary district, Roane County, the United Fuel Gas Co. is rigging up on the N. M. Parsons & Co.'s farm. In Murphy district, Ritchie County, the Hope Construction & Refining Co. is building a rig on the Andrew Jordan farm. In Union district, John Lock and others are rigging up on the John A. Hall farm.

In Union district, Wood County, Rothwell & Co. are rigging up at a test on the John Freshwater farm. In Washington district, Samuel Glen and others have started to drill on the Myra K. Smith farm. In Grant district, Keith Thompson has started to drill on the James Adams farm. In the same district, Rolston & Morrison are drilling a second test on the Robert Inghram farm.

On the Little Kanawha River, Center district, Calhoun County, the Hope Construction & Refining Co. has the rig completed for a second test on the A. Hardman farm. In Central district, Doddridge County, R. Broadwater & Co. have started to drill on the George Wanstreet farm. In Union district, Ritchie County, John Lock and others have started to drill on the John A. Hall farm. In Glenville district, Gilmer County, the Sears Oil & Gas Co. is due in the Big Injun sand on the A. B. Campbell farm. In Mannington district, Marion County, the Delmar Oil Co. has drilled through the fourth sand on the John L. Hays farm.

Southwest Pennsylvania

In Springhill Township, Greene County, Ross Conklin & Co. have a duster at a test on the John Hampson farm. In Morris Township, the Greensboro Gas Co. drilled deeper its second test on the F. A. Headley farm. It showed no improvement.

In Greene Township, the Peoples Natural Gas Co. has a gasser in the Elizabeth sand at a total depth of 3,374 feet on the Ross Huck farm. In Gilmore Township, Johnson & Eddy's test on the Catherine Jones farm is a gasser in the fifth sand. In Perry Township, the Charles Fox Gas Co. has a gasser in the Bayard sand at a depth of 3,009 feet.

In North Strabane Township, Washington County, the Wasco Fuel Co. has completed a test on the J. R. McNary farm. It is a gasser in the Big Injun sand. In the same township, the same company has a rig completed on the Citizen Water Co.'s property. In South Franklin Township, the Carnegie Natural Gas Co. is drilling a test on the J. S. Hunter farm.

In Morris Township, Greene County, the Martin Oil & Gas Co. has drilled a 3-year-old gasser on the Jarret Fox farm deeper into the Big Injun sand. It is producing about 15 bbls. a day. In Plum Township, Allegheny County, O. S. Grubbs and others are due in the sand at a test on the O. S. Grubbs farm. In Patton Township, Baughman & Rudert are due in the sand on the L. Cino farm. In Ross Township, Martin & Co. have a rig up on the Hannah farm. In McCandless Township, the Duff City Gas Co. is drilling at 1,700 feet on the A. Aultmyer farm. In the same township, M. M. Walley & Co. are drilling No. 3 on the Hilard & Co.'s lot.

BOLTS AND NUTS

Tables of standard sizes for square and hexagonal bolt head and nuts and for the corresponding wrench openings were recently approved by the American Engineering Standards committee as a tentative American standard. The tables were established with much effort and care by a sectional committee appointed under the procedure of the A. E. S. C. by the organizations sponsoring this work, viz., the Society of Automotive Engineers and the American Society of Mechanical Engineers. These deal with rough, semi-finished and finished square and hexagonal bolt heads and regular nuts, finished hexagonal cap screw heads, set screw heads, finished and semifinished hexagonal jam nuts, hexagonal light nuts, hexagonal and square machine screw nuts, and stove bolt nuts, hexagonal castellated nuts, and wrench openings.

HERE'S A NEW SLANT on the crooked hole evil!

The PREVENTION of crooked hole, rather than the correction of this evil is the new purpose in drilling; made possible by the Nebergall Spiral Stem whose advantages have made it the most practical and economical stem in drilling history.

The Spiral Stem FILLS the hole, guides the bit and FORCES it to cut straight through all obstructions. This keeps the well bore not only STRAIGHT, but also VERTICAL.

The list of the many proved advantages of the SPIRAL STEM reads like an answer to a driller's prayer.

1. Prevents Sucker Rods from Cutting Tubing
2. Mixes Mud
3. Prevents Mud-Rings
4. Cleans Path for Bailer
5. Reduces Whipping
6. Guards Against Caving
7. Simplifies Fishing Jobs
8. Protects Casing Shoe
9. Protects Casing From Line Cutting
10. Perfects Under-Reaming
11. Strengthens Walls
12. Lessens Breakage of Jars
13. Forged Steel Spiral Stems Last Practically Forever

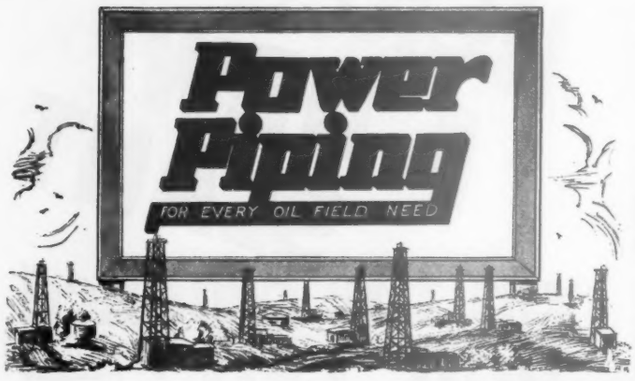
Manufactured Exclusively by

TITUSVILLE FORGE COMPANY
Titusville Penn.

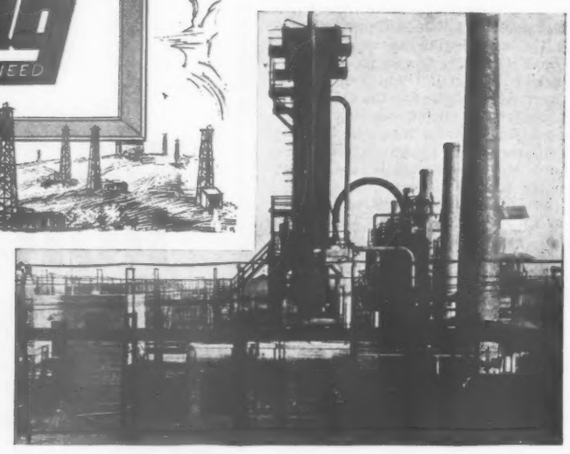
Distributed by
THE CONTINENTAL SUPPLY COMPANY
St. Louis, Mo.
THE CONTINENTAL WELL SUPPLY CO.
72-76 Trinity Court
N. Y. C.

SPIRAL STEM

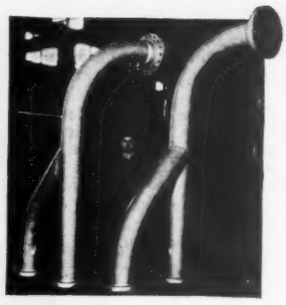
You Can't Go Wrong with a Tifoco Tool



Throughout the Field



Serving
Refineries
Everywhere
With Efficient
Economical
Installations



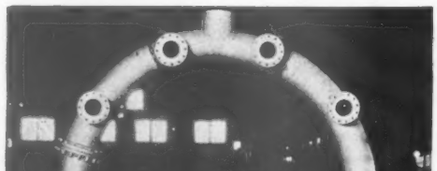
10" bend for high-power steam service with welded connection, outlet increased to 12" and vanstoned!

Power Piping Co. renders to refineries a service fitted to the needs peculiar to the industry!

Headers, exchangers, bubble towers, absorbers, everything in the way of refinery or chemical-process equipment!

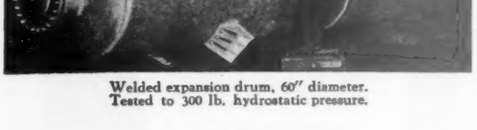
POWER PIPING CO. - PITTSBURGH, PA.

Welded expansion drum, 60" diameter. Tested to 300 lb. hydrostatic pressure.

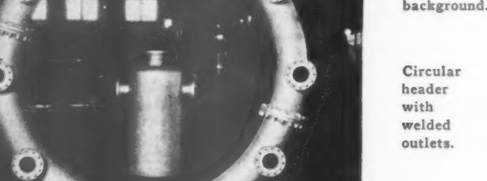


Receiver separator shown in background.

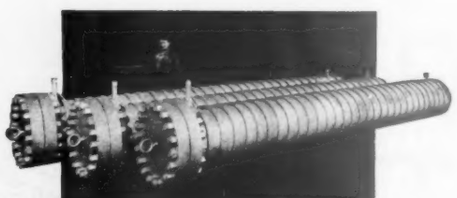
Circular header with welded outlets.



10" welded manifold, all seamless tubing, for high-pressure steam service



16" 600-pound standard flange tongue-and-groove connection



Pressure Vessels for Chemically Fire-proofing Wood.

No matter how perplexing your problem may seem, "put it up to Power Piping." Write!

STEEL TRADE REMARKABLY STEADY; YEAR TRIFLE BETTER THAN EXPECTED

By B. E. V. Luty

PITTSBURGH, Pa., Sept. 19. — The steel trade has been giving an exhibition of remarkable steadiness for about three months. This seems satisfactory in a way, but it is not to the liking of producers, who have been wanting to see improvement. Demand has been below that of a year ago, and seasonal improvement, generally expected to come after the midsummer date, would help to relieve the condition, but no seasonal improvement has occurred.

Steel ingot production in August was practically at the same rate as shown by July, there being the insignificant increase in the daily rate of 1.1 per cent, total ingot production in August being approximately 3.500,000 tons. The average rate thus far this month is not materially above or below the July-August rate.

Predictions of increased demand continue to be made, but with much less confidence than a month or two ago, for it is realized that the time when demand commonly increases, if it is to increase at all, has now passed, and it will not be long until the decrease that often occurs towards the close of the year will be at hand. A continuance of the recent rate of production would make the year's total less than 10 per cent under that of 1926, the record year. The year would be if anything a trifle better than was expected, for at the beginning of the year a somewhat smaller tonnage was commonly expected.

Orders Steady

The flow of orders has been quite steady, as indicated by the Steel Corporation's unfilled tonnage reports, which will need to be studied with allowance for certain special conditions. This unfilled tonnage decreased 405,191 tons in May, then showing successive increases in the next three months of 2,305 tons. 88,768 tons and 54,023 tons respectively. In May there were heavy shipments, partly against backlogs, shipments dropping in June and decreasing just slightly in the next two months. In June there were some quarterly contracts entered and in July some rail tonnage, also an extra amount of structural steel. In August the bookings were of ordinary every-day character. Making allowance for these circumstances, it would seem that the ordinary run of buying increased a trifle. August shipments were at about 71 per cent of capacity.

Demand for standard or merchant pipe keeps up quite well. It has run this year a trifle under that of last year, but there is no progressive decrease. Demand for oil country tubular goods continues very light as it has been all this year. From last year demand has probably fallen off more in seamless than in welded material, on account of there being so little drilling of deep wells.

Very little line pipe business has been placed in the past few weeks, there being merely a few small lot orders. It is claimed there is much line pipe business in sight, including gas lines from Amarillo, Tex., to Denver, from Monroe, La., to Kansas City, from Monroe to St. Louis and from Moffat County, Colorado, to Salt Lake City and Ogden, Utah.

Quotations Unchanged

Finished steel prices are not quotably changed but in several lines they are not on an overly secure foundation. The case of bars, shapes and plates is of particular consequence, as small lots down to carloads several weeks ago dropped to the 1.80 cent price previously ruling only on large lots, and there is danger now that when large buyers come to make fourth quarter business the market will yield to them, giving them the concession from the small lot price they feel they should have by long precedent. In sheets there is increasing doubt whether the mills are really maintaining the advanced prices they adopted four months and more ago, 2.25 cents on blue annealed, 3.00 cents on black, 3.85 cents on galvanized and 4.25 cents on automobile sheets.

Pig iron is very dull indeed. Valley prices remain at $18 for Bessemer, $17.25 for basic and $17.50 for foundry iron, these prices being said to be below cost to merchant furnaces, but affording a little margin to the steel works that now sell pig iron in the open market.

Connellsville coke remains dull, prices being unchanged. Scrap is dull and a trifle easier.

LA.-ARK. WILDCATS

(Continued from Page 68)

Co. is to drill a test on the Sentell & Dickson lease.

Caldwell Parish

Southern Crude Oil Purchasing Co. has resumed drilling in No. 8 Caldwell, Section 5-13-5e, and is down 1,350 feet. This test has been shut down since April at 140 feet.

Catahoula Parish

S. D. Hunter has abandoned the location he had staked last January for No. 2 Tensas Delta, Section 21-9-7e. Lochnager Oil & Gas Co. has a derrick up for its second test on the Beasley land, Section 23-9-6e. The first test was abandoned several weeks ago after testing salt water. That was the test which staged a sensational gas blow-out, blowing at the rate of around 50,000,000 feet of gas daily for a half hour.

Claiborne Parish

Magnolia Petroleum Co. is reaming to the bottom at 4,090 feet in No. 1 Lee, Section 16-22-8.

DeSoto Parish

Dixie Oil Co.'s No. 1 Jenkins, Section 9-12-11, is drilling lime at 5,553 feet.

Grant Parish

Holmes and associates' No. 2 fee, Section 17-9-1e, was dry at 1,700 feet and has been abandoned. These operators, however, have staked a location for another test in Section 18, the second on the Swope lease. Swope and associates have a derrick for No. 5 fee in the same section.

Jackson Parish

Grigsby & Co. has abandoned No. 1 Adams, Section 22-17-4w. It has been shut down at 2,900 feet since last January.

La Salle Parish

Eibert Petroleum Co. is coring at 1,390 feet in No. 1 Hardtner & Tannehill, Section 34-11-2e.

Natchitoches Parish

Lawson & Phariss have abandoned No. 2 Clark & Morse, Section 3-5-6, after drilling to 1,244 feet. No test was made as this was a geological test. These operators are rigging up for another test, No. 1 Bolton, Section 28. Ohio Oil Co. is reaming at 3 036 feet in No. 2 L. & A., Section 26-13-6.

Rapides Parish

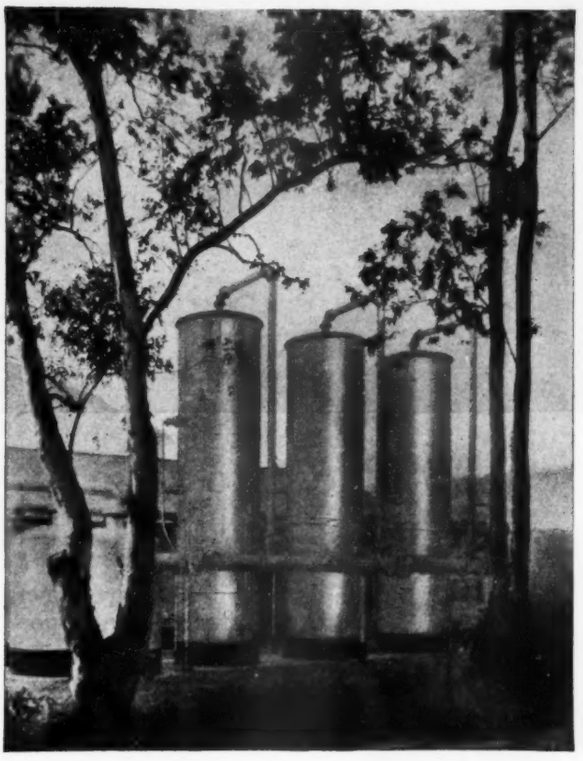
Minnesota Oil Corp. has abandoned No. 1 Wettermack, Section 7-5-3. It has been shut down since June at 2,996 feet where it tested salt water. George Sabatier and associates' No. 1 Ritchie, Section 38-5-4, after testing dry at 2,750 feet has been abandoned.

Red River Parish

J. H. Askew is drilling at 1,120 feet in No. 1 Richardson, Section 25-13-11.

Richland Parish

Gulf Refining Co.'s No. 2 Marshfield, Section 29-17-6e, is drilling gumbo at 1,970 feet. In Section 30, this company is rigging up for No. 3 Marshfield. Louisiana Petroleum Co.'s No. 1 Binion & Sartor, Section 22-17-6e, shut in since April, has been completed as a 5,000,000-foot gasser at 2,474 feet. Moody & Seagraves have cemented 6-inch casing at 2,302 feet in No. 1 Hemler, Section 20-16-6e. Their No. 1 McCoy, Section 32, is drilling at 2,155 feet, and their No. 1 Jones, Section 15-18-7e, at 400 feet. Natural Gas & Fuel Corp. is drilling at 1,850 feet in No. 1 Sartor, Section 20-16-6e. This company has staked locations for two more tests, No. B-2 Sartor, Section 19-16-6e, and No. B-3 Sartor, Section 30. Ruston Drilling



Campbell Installations

not only reflect the highest degree of engineering efficiency in design and operation, but present an exceedingly attractive appearance—a distinct asset to any operating company.

Over 1,000,000 gallons of natural gasoline are daily produced by our Absorbers.

Ask for our New Illustrated Catalog.

J. A. Campbell

Natural Gas Engineer

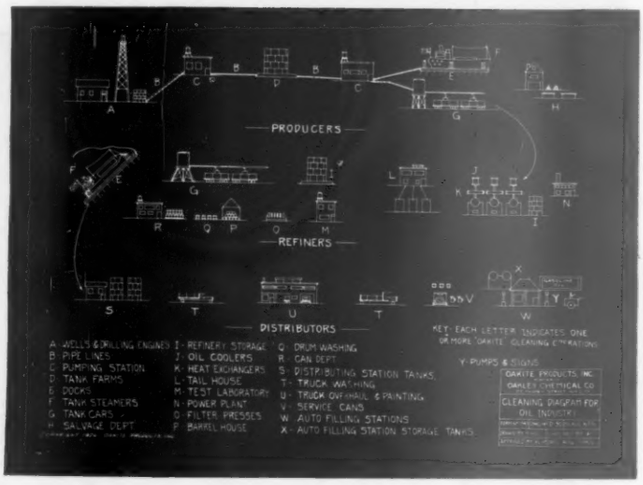
Consulting—Designing—Constructing

P. O. Box 669 LONG BEACH, CALIF.

CAMPBELL

OIL FROTH

absorber


PRODUCERS
REFINERS
DISTRIBUTORS
KEY: EACH LETTER INDICATES ONE OR MORE OAKITE CLEANING OPERATIONS
A - WELLS & DRILLING ENGINES
B - PIPE LINES
C - PUMPING STATION
D - TANK FARMS
E - DOCKS
F - TANK STEAMERS
G - TANK CARS
H - SALVAGE DEPT.
I - REFINERY STORAGE
J - OIL COOLERS
K - HEAT EXCHANGERS
L - TAIL HOUSE
M - TEST LABORATORY
N - POWER PLANT
O - FILTER PRESSES
P - BARREL HOUSE
Q - DRUM WASHING
R - CAN DEPT.
S - DISTRIBUTING STATION TANKS
T - TRUCK WASHING
U - TRUCK OVERHAUL & PAINTING
V - SERVICE CARS
W - AUTO FILLING STATIONS
X - AUTO FILLING STATION STORAGE TANKS
Y - PUMPS & SIGNS
OAKITE PRODUCTS, INC.
CHEMICAL CO.
CLEANING DIAGRAM FOR OIL INDUSTRY

25 places to save time, labor, and money!

GLANCE at the letters on the chart shown above. Each one represents an opportunity for an important economy. Each marks a place or an operation in some division of the oil industry where time, labor, and money can be saved - - - through scientific Oakite cleaning.

Measured by former standards, the time required for cleaning the modern, efficient Oakite way is incredibly short. Tank cars and storage tanks are now cleaned in hours instead of days. And stripped for repainting in a small fraction of the time formerly required. Salvage parts, drilling equipment and other tools are cleaned *in quantity*. No time is wasted in tedious hand scrubbing.

Oakite methods for these, and the other operations indicated above are fully described in our booklet "Oakite in the Oil Industry." Send for a copy - - - or better still, get first-hand information from the Oakite Service Men in attendance at Booths 61 and 62 when you visit the Tulsa Exposition, Sept. 24th to Oct. 1st.

Oakite is manufactured only by

OAKITE PRODUCTS, INC., 44C Thames St., NEW YORK, N. Y.

(formerly OAKLEY CHEMICAL CO.)

Oakite Service Men, cleaning specialists, are located at

Albany, N. Y., Allentown, Pa., *Atlanta, Altoona, Pa., Baltimore, *Birmingham, Ala., *Boston, Bridgeport, *Brooklyn, Buffalo, *Camden, N. J., Charlotte, N. C., Chattanooga, Tenn., *Chicago, *Cincinnati, *Cleveland, *Columbus, O., *Dallas, *Davenport, *Dayton, O., Decatur, Ill., *Denver, *Des Moines, *Detroit, Erie, Pa., Flint, Mich., Fresno, Cal., *Grand Rapids, Mich., Harrisburg, Pa., Hartford, Houston, Tex., *Indianapolis, *Jacksonville, Fla., *Kansas City, *Los Angeles, Louisville, Ky., *Memphis, Tenn., *Milwaukee, *Minneapolis, *Moline, Ill., *Montreal, Newark, Newburgh, N. Y., New Haven, *New York, *Oakland, Cal., *Omaha, Neb., *Philadelphia, *Pittsburgh, Portland, Me., *Portland, Ore., Providence, Reading, Pa., *Rochester, N. Y., Rockford, Ill., *Rock Island, *San Francisco, *Seattle, *St. Louis, South Bend, Ind., Syracuse, *Toledo, *Toronto, Trenton, *Tulsa, Okla., Utica, N. Y., *Vancouver, B. C., Williamsport, Pa., Worcester, Mass.

*Stocks of Oakite Materials are carried in these cities.

OAKITE

TRADE MARK REG. U.S. PAT. OFF.

Industrial Cleaning Materials and Methods

Co. is repairing gas line at No. 1 McCoy, Section 30. This test is shut down at 2,341 feet. This company's No. 2 McCoy, Section 8, is down 2,320 feet where 6-inch casing has been cemented. Standard Drilling Co. is at 1,476 feet in No. 1 Delta Hardwood, Section 32-16-7e. Texas-Louisiana Carbon Co. is drilling at 2,723 feet in No. 1 Broughton, Section 1-15-6e. Woodley Petroleum Co. and Triangle Drilling Co. are in gumbo at 1,940 feet in their joint No. 1 Hemler, Section 31-18-7e.

Sabine Parish

Arkansas Fuel Oil Co. is rigging up for its second test on the Moore lease, Section 32-10-12. This company's No. A-1 Logan, Section 32-10-13, is drilling at 3,255 feet. Foster and associates' No. 1 Nabors, Section 30-10-12, is shut down waiting orders following a gas blow-out estimated at 3,000,000 feet daily from a formation at 3,275 feet. Frazier and associates' No. 1 Harris, Section 29, is drilling at 1,955 feet. Magnolia Petroleum Co.'s No. 2 Hall, Section 33, is drilling chalk rock at 1,866 feet. Moffett and associates' No. 2 Moore, Section 5-9-12, has been completed as the best producer in the Pleasant Hill district, making 1,600 bbls. daily of clean oil from sand at 3,234-54 feet. A. H. Tarver's No. 1 Long Bell, Section 5-8-13, is shut down temporarily waiting for fuel. It is in a blue gumbo at 2,588 feet. H. P. Tate's No. 1 Cook, Section 23-10-12, is reaming at 3,140 feet. These tests all are in the Pleasant Hill Field.

Webster County

Shreveport-El Dorado Pipe Line Co.'s No. 1 Gamble, Section 33-20-8, is coring at 2,945 feet.

West Carroll Parish

Palmer Corp. is setting 6-inch casing at 2,680 feet in its No. 1 Pioneer, Section 16-20-10e. The test is in a rock formation believed to be gas rock. Phillips Petroleum Co.'s No. 1 Marion, Section 32-20-9e, is drilling plug at 2,250 feet.

Winn Parish

Ohio Oil Co.'s No. 1 Edenborn, Section 31-10-4w, is being reamed at 127 feet. This company's No. 1 Rolen, Section 9-12-1w, is drilling sand at 2,034 feet. H. M. Roark has set 12½-inch surface casing at 40 feet in No. 3 Southern Minerals Co., Section 19-11-3w.

ARKANSAS

Union County

Magnolia Petroleum Co.'s No. 1 Carroll, Section 1-17-14, is drilling red shale at 2,925 feet. In the same section, Ohio Oil Co.'s No. 2 Crain is coring at 2,978 feet. Mazda Oil Corp.'s No. 1 Boyd, Section 9-17-15, is reaming to the bottom at 2,450 feet. Rice and associates' No. 1 Newton, Section 13-17-16, has been shut down at 2,900 feet.

Ouachita County

H. M. Harrell's No. 1 Camden, Section 12-12-18, tested dry with a small showing of salt water and dead oil in a sand at 1,610-19 feet. Magnolia Petroleum Co.'s No. B-1 Stout, Section 28-14-16, is drilling ahead at 2,517 feet after testing salt water at 2,496 feet. Moody Oil Corp.'s No. 1 Bacon, Section 12-11-18, has been shut down at 1,206 feet.

Ashley County

Glassell and associates' No. 1 Keller, Section 10-19-5, is drilling at 2,353 feet.

Calhoun County

Genther and associates' No. 1 Stout, Section 3-14-16, is drilling at 1,100 feet.

Columbia County

Big Creek Oil Co.'s No. A-1 Runyon, Section 3-16-21, is down 350 feet.

Miller County

Guest and associates' No. 1 M. & P. Bank, Section 30-15-26, has been shut down at 2,860 feet. Lenz and associates' No. 1 Mann, Section 22-15-26, is drilling chalk rock at 1,492 feet.

GULF COAST FIELDS

(Continued from Page 76)

moon is drilling at 825 feet. In the Sour Lake Pool Orange Petroleum Co.'s No. 3 Merchant was dry at 4,400 feet and is shut down. Same company's No. 4 Merchant is being rigged up. Cove Gas & Oil Co.'s No. 1 Cotton in Saratoga is shut down at 850 feet. The Texas Co.'s No. 1 R. S. Sterling at Batson is being reamed at 3,748 feet.

Fort Bend County

Navarro Oil Co.'s No. 2 Robinson B in the Blue Ridge Pool is making considerable gas and a little oil at 3,658 feet and No. 3 on the same lease is drilling at 1,100 feet. Navarro Co.'s No. 3 Robinson A was abandoned at 3,681 feet. In the same pool J. S. Abercrombie & Co.'s No. 3 West Schenk is swabbing 400 bbls. daily from 3,800 feet. Cunningham Production Co.'s No. 1 Blakeley flowing 900 bbls. daily from 2,850 feet. Gulf Production Co.'s No. 15 Bassett Blakely C is drilling at 3,900 feet and location has been made for No. 16.

In the Big Creek area, Gulf company's No. 42 T. W. Davis was completed flowing 170 bbls. of 36.9 gravity oil from 3,873 feet. Same company's No. 35 on the Davis lease is drilling at 3,800 feet. The Texas Company's No. 2 Wheat is drilling at 3,800 feet. At Orchard the Gulf company's No. 13 Moore is drilling at 3,890 feet. At Long Point the same company's No. 1-A Beard is drilling sandy shale at 2,771 feet. No. 4 Trone is straightreaming at 1,131 feet and No. 4 Wolf topped the caprock at 866 feet. Rycade Oil Co.'s No. 16 Wisdom at Nash Dome is drilling at 4,189 feet and No. 17 is a rig. Same company's No. 4 F. Meir was shot at 4,108 feet without results and is to be drilled deeper. At Boling Dome the Sun Oil Co.'s No. 3 J. R. Farmer twisted a bit off at 2,730 feet and is drilling at 2,460 feet after sidetracking at 2,181 feet. Same company's No. 2 H. R. Farmer got a showing when the caprock was topped at 1,091 feet and casing is being set for a test. Sun Oil Co.'s No. 1 Kasperek is drilling shale at 1,942 feet.

Brazoria County

The Texas Company's No. 83 Hogg is flowing 400 bbls. daily from 2,600 feet. The well is in the West Columbia Pool. Starks and associates' No. 3 H. C. Hinckle is drilling at 990 feet. Roxana Petroleum Co.'s No. 1 State Allen topped the pay at 5,141 feet and a liner is being run, total depth 5,156 feet. No. 4 Allen can't make hole because of heavy gas at 5,017 feet. Roxana Petroleum Corp.'s No. 1 Randon is a rig and No. 2-A Pabst was junked at 6,319 feet when the drill stem was pulled in two. Associated Oil Co.'s No. 1 Seaburn had salt at 4,150-56 feet and backed up to 3,907-27 feet to make a test. Pure Oil Co. and Humphreys' No. 1 Armstrong had oil sand at 4,402-21 feet and cut the 4-inch at 3,340 feet to abandon. Three miles west of Columbia Danciger Oil Co.'s No. 1 Carrie Bartlett is a location.

Miscellaneous Texas Counties

In Houston County, The Texas Company's No. 1 Houston Coal & Manufacturing Co., 1½ miles south of Lovelady, was abandoned in shale at 3,876 feet. The same company's No. 1 H. Kempner, 1 mile southeast of Lovelady, is drilling sand and shale at 880 feet. Three miles southeast of Bryan in Brazos County the Rio Bravo Oil Co.'s No. 2 M. Lanza is drilling shale at 1,292 feet.

LOUISIANA GULF COAST

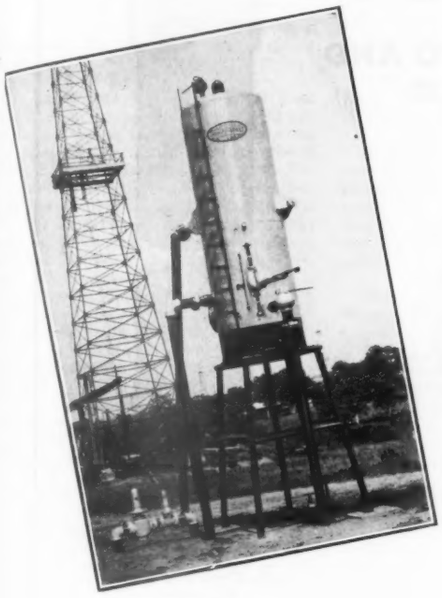
Acadia Parish

In the Evangeline Field, Cline and associates' No. 1 Cline topped sand showing oil at 1,725 feet and a strainer is being set at 1,760 feet. Coastal Oil & Fuel Co.'s No. 95 Crowley fee is drilling at 1,625 feet. Yount Lee Oil Co.'s No. 1 Houssiere Latriella set 30 feet of 4½-inch strainer at 2,535 feet and bailed salt water from the sand showing oil. The strainer was pulled and the test is drilling ahead at 2,710 feet. F. I. Getty's No. 2 Jennings-Clement is drilling at 2,300 feet. The Texas Company's No. 2 Rayner heirs lost the hole at 1,204 feet trying to set 12½-inch pipe and came back to 350 feet to sidetrack and is now drilling at 1,410 feet.

Calcasieu Parish

In the Edgerly Pool, Gulf Refining Co.'s No. 7 Industrial Lumber Co. was abandoned at 4,152 feet. Gulf company's No. 3 Robert Linclon fee is being rigged up and No. 10 Higgins-B is a location. Gulf company's No. 7 Lutcher-Moore in

No. 2 National Separator—Seminole Field.



No. 1 National Oil and Gas Separator. One of many in the Seminole Field.

No. 3 National Separator—Burbank Field.

All three of the principal methods of oil and gas separation are employed in the NATIONAL. (a) Expansion and Compression; (b) Scrubbing against the walls of the tank; (c) Scrubbing through perforations.

NATIONAL SEPARATORS
Combine Efficiency With Simplicity

The National Oil and Gas Separator was designed to give the maximum of efficiency in separating oil and gas, and at the same time be simple and automatic in operation. Nothing was spared in order to obtain the desired results regardless of the cost of construction. The following features are evidence of this:

(1) All inlets through which the oil and gas from the well enters the separator are installed tangentially to the cylindrical wall of the tank. These inlets are made by raising a section of the wall of the tank itself, providing a perfectly smooth path for the oil upon entering.

(2) Splashing and surging of the oil is overcome by the shape and construction of the inlets.

(3) The gas has a long travel and an increased number of scrubbings is given to the oil.

(4) Ample gas outlets are supplied so that complete separation may be made under very low pressure.

(5) Large capacity oil discharge valves are used so that large volumes of oil may be handled under low pressure.

(6) All valves are simple and positive in operation and require no attention after once being set.

(7) Service men are always on hand to aid in setting and adjusting valves.

(8) National Separators insure the desired results of a separator, which are:

Complete separation of gas from the oil.
Dry gas for plant use.
No gas in stock tanks.
Minimum cutting of oil.
Low pressure operation when desired.
Large oil and gas capacity.
Simple and automatic operation.
Sizes and pressures for every purpose.

NATIONAL TANK COMPANY TULSA

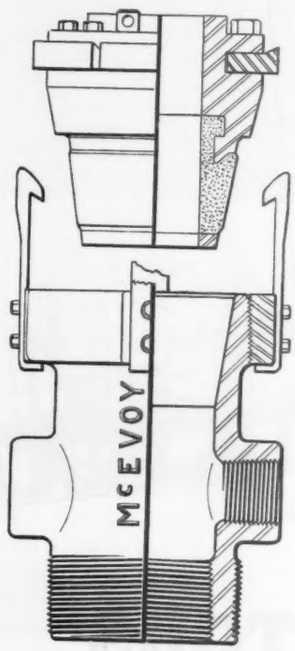
Oil and Gas Separators
Flow Tanks
Welded Stock Tanks
Bulk Storage Tanks
Absorber Towers
Casinghead Storage Tanks
Pressure and Vacuum Tanks

NATIONAL
TANK COMPANY
TULSA, OKLAHOMA

Truck and Wagon Tanks
Bolted Tanks and Parts
Wooden Tanks
Pressure and Vacuum Valves
Oil and Gas Regulators
Forge Boxes
Special Plate and Sheet Steel Products.

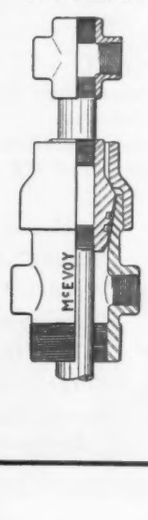
McEvoy Products

McEvoy Casing Head with Safety Pressure Control attachment.

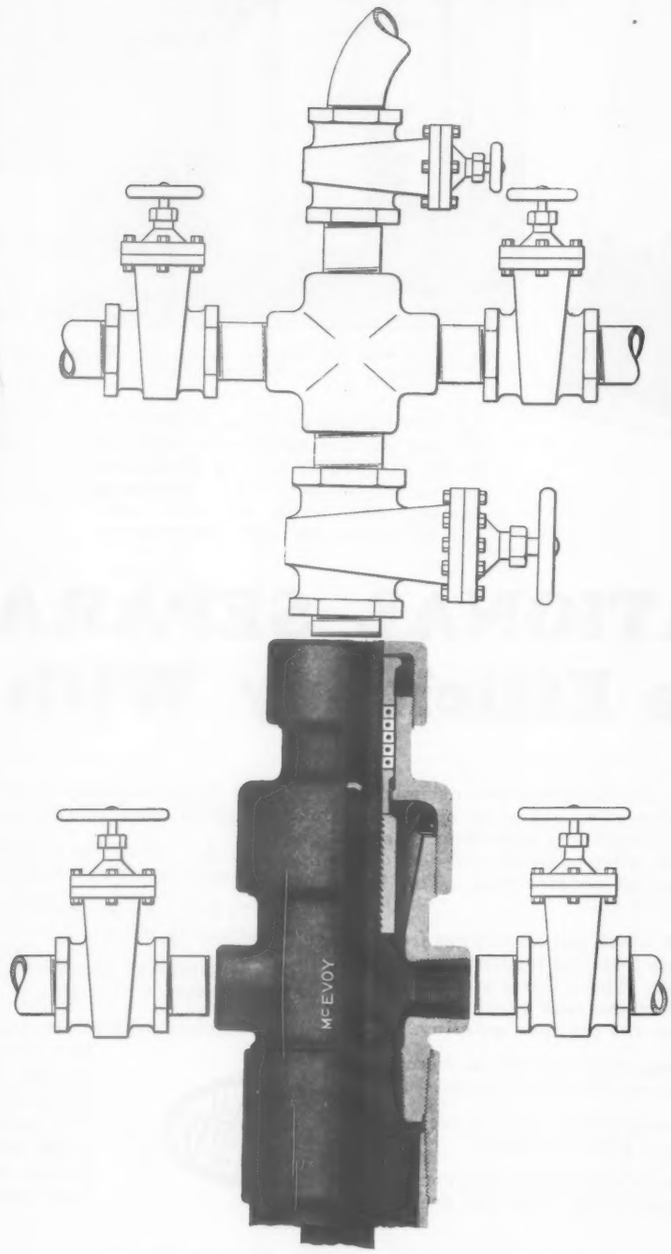


McEvoy Casing Head with Bailing, Swabbing and Flowing attachment.

McEvoy Casing Head with Tubing Hanger attachment.



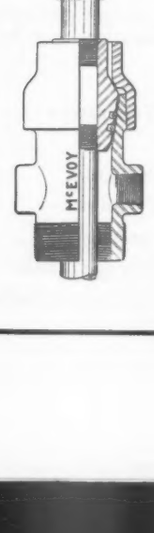
McEVOY UNIVERSAL CASING AND TUBING CONTROL HEAD



McEvoy "Wireless" Well Strainer

McEvoy Set Shoe Assembly

McEvoy Casing Head with Pumping Attachment



J. H. McEVOY & COMPANY
Houston, Texas

Pacific Coast Representative

McEvoy Screen Pipe Company
2428 East 56th Street, LOS ANGELES, CALIF.

Starks Dome is a location. McDaniels & Ellis' No. 1 Ecker in Edgerly tested salt water at 3 800 feet and is to be deepened. Hercules Oil Co.'s No. 1 Paraffine cored sand showing oil at 3,975 feet and again at 3,985 feet. An 8-foot core of rock salt was taken at 3,992 to 4,000 feet and the bit went out of the salt at 4.000 feet. A strainer has been set and the test is being bailed. Union Sulphur Co.'s No. 721 fee is drilling sand at 2,647 feet. Rex Petroleum Co.'s No. 7 Hunter estate is drilling at 3.760 feet after testing salt water at 3.545 feet. Wilson-Broach's No. 5 Wilson is being rigged.

Lockport

Ten operations in the Lockport Pool being carried on by the Vacuum Oil Co. and Gulf Refining Co. were reported from that area during the past week. No. 8 Miller is being bailed at 4,400 feet. No. 17 Miller is drilling at 4.100 feet. No. 18 Miller is drilling at 4,250 feet. No. 2 G. W. Farquahar and others are shut down at 4.425 feet. Location is being made for No. 3 on the same lease. No. 5 G. W. Farquahar and others-"A" is drilling at 5 525 feet. No. 2 Friedberg & Wolf is drilling at 4,900 feet. No. 5 Bordages is drilling at 3.400 feet. No. 1 feet-A is drilling at 2.450 feet. Location was made for No. 4 Bayou D'Inden "State."

Cameron Parish

At Sweet Lake, Pure Oil Co.'s No. 4 Sweet Lake is bottomed at 5,141 feet and preparations are being made to set two joints of 4¾-inch strainer. No. 5 on the same lease is drilling hard, crystallized sand at 4,997 feet. No. 2 is washing at 5.100 feet. No. 3 Sweet Lake came in flowing 72 bbls. per hour showing a little water and sand and sanded up 24 hours later. The hole is being cleaned and a 3-inch liner is to be run. At Hackberry, Yount Lee Oil Co.'s No. 5 State Black Lake is drilling rock at 2,910 feet. In the same area Calcasieu Oil Co.'s No. 2 Caldwell is drilling at 300 feet.

Miscellaneous Parishes

In Evangeline Parish, Tom Hincey and associates' No. 1 Ducide Guillory near Pine Prairie is a rig. John Carrodine and associates' No. 1 Walsh at Welsh is estimated to be a 25-bbl. pumper at 1,339-55 feet. In Iberia Parish and at Fausse Point, Gulf Refining Co.'s No. 1 Broussard is drilling shale at 3,500 feet. Calcasieu Oil Co.'s No. 1-A Schwing is drilling shale at 3,276 feet. In St. Marys Parish, Border's No. 1 Grand Lake is drilling shale at 4,886 feet. Louisiana Exploration Co.'s No. 1 W. Cote Blanche is reaming at 1,800 feet.

SOUTHWEST TEXAS

(Continued from Page 74)

450 feet to north line and 150 feet to east line.

Caldwell County

Humble Oil & Refining Co.'s No. 1 Clingensmith, Squire Damon Survey in the Dale Field, is rigged up 150 feet to southeast line of survey and 150 feet to southwest line of lease; No. 2 Clingensmith, same survey, is rigging up at 750 feet to southeast line of lease and survey and 150 feet to southwest line of lease.

The Texas Company's No. 1-B Beatty, Nich Kelly Survey, 150 feet to southeast and southwest lines of lease, topped Serpentine at 2,068 feet and is at 2,142 feet with no oil show.

Refugio County

Houston Oil Co.'s No. 2-A Rooke is drilling at 2,600 feet in the Refugio gas field.

Houston Gulf Gas Co.'s No. 2 Moody in the same field is drilling at 1,450 feet; No. 10 Fannie Heard at 2,230 feet blew out and ran wild for a week, estimated at 30,000,000 feet and will be completed as soon as pressure goes off. Well has been turned into line.

Cole Gas Field—Duval

Houston Oil-Sun No. 1 S. Benavides, corner Blocks 75, 76, 129, 130, is location. Houston Oil (Roxana) No. 1 "F" S. Benavides, Block 97, located 75 feet to northeast and southeast lines, has been spudded in. O. W. Killam's No. 8 R. Benavides, Survey 11, Block 6, located 585 feet to northwest and 150 feet to southwest lines, has derrick up; No. 2 Bruni, Survey 585, located 1,090 feet to west line and 150 feet to north line, is location. Newton Drilling Co.'s No. 1 Bruni, Survey 9, at 500 feet to northwest lines and 150 feet to northeast lines, which at 2,316 feet made 7,000,000 feet of gas with a rock pressure of 765 pounds is to be deepened in the hopes of finding deeper production. Trussell, Cezeaux & Putman's No. 1 Bruni, Survey 10, located 150 feet to northwest lines and 450 feet to northeast lines, is drilling at 800 feet.

Simms Pool

Breen-Woodward and others' No. 1 Dinn, Survey 666, is location 1,170 feet to north and 150 feet to east lines.

Humble-Reiter-Foster Pool

Humble-Reiter-Fosters No. 4 Kohler, Survey 400, at 660 feet to SW cor., which pumped 20 bbls. at 2.709 feet, is to be reworked; No. 6 Kohler, Survey 400, at 60 feet to west line and 660 feet to south line, at 2,778 feet is pumping 30 bbls. daily.

Piedras Pintas Dome

Humble Oil & Refining Co.'s No. 7 Walsh, Survey 185, located 2,050 feet to east line and 1.750 feet to north line, is drilling at 1,587 feet.

Randado Field—Jim Hogg

Magnolia Petroleum Co.'s No. 27 Merchants State Bank, Survey 415, located 1,725 feet to west line and 1.500 feet to north line, is drilling at 1,050 feet.

Alworth Pool

Smilock No. 1 F. S. Martinez, Survey 38, Block 4, is location 660 feet to SE cor. Alworth-Stevens-Hild No. 20 M. Garza, Survey 39, Block 7, located 35 feet to southeast lines and 300 feet to northeast lines, is moving on.

Schott Field—Webb

Magnolia Drilling Co.'s No. 9 Garcia. Survey 58, located 937 feet to west line and 150 feet to north line, has derrick up.

Albercas Field

Newton Drilling Co.s No. 2 Bruni, Block 64, located 600 feet to west line and 1,470 feet to south line, is location. Magnolia Petroleum Co.'s No. 1 Yeager-Strolman, Block 65, located 150 feet to SW cor., is drilling at 195 feet.

Aviator Tracts

Pittman & Moriarty (Radio lease) No. 7 Puig, Block 4, located 500 feet to east line and 850 feet to north line, is resetting casing at 1,688 feet to test sand at 1,694 feet.

Carolina-Texas Field

D. J. Simmons' No. 2 de la Garza, Survey 335, Block 8, at 150 feet to SW cor., is standing at 400 feet. Breen & Woodward's No. 2 Webster, NW NE, Survey 684, is location. Houston Oil Co.'s No. A-2 Barnsley, Survey 268, Block 12, at 400 feet to north line and 350 feet to west line, is coring at 2,714 feet after testing salt water at 2,640 feet. T. P. Morgan's No. 2 de la Garza, Survey 335, Block 23, at 400 feet to north line and 350 feet to west line, is drilling at 2,327 feet. Magnolia Petroleum Co.'s No. 2 Webster, SW NE NW, Survey 684, located 150 feet to NW cor., is drilling at 1,500 feet.

Cole Gas Field No. 2

Cole Petroleum Co.'s No. 36 Benavides, Survey 412, Block 14, located 159 feet to east line and 266 feet to north line, is drilling at 4,083 feet; No. 48 Benavides, Survey 412, Block 5, located 125 feet to north line and 733 feet to east line, is testing sand at 2,338 feet through drill stem.

Mirando Valley—Zapata

O. W. Killam's No. 1 Hinnant Survey 74, located 1,980 feet to south line and 1,981 feet to east line, has been spudded in.

Dale Field—Caldwell

Magnolia Petroleum Co.'s No. 1 Taylor, G. W. James Survey, 150 feet to NW cor., is drilling at 940 feet. Sun Oil-Empire Gas & Fuel's No. 2 Talley, W. C. Swearingen Survey, 150 feet to northwest and southwest lines, depth 2,285 feet, on pump made head of 30 bbls. after tubing was set. Murchison's No. 1 Copeland, Nich Kelly Survey, total depth 2,568 feet in Edwards, is trying to make a water

DON'T WAIT

Until the Mud Settles and it's Impossible to Break Through

KEEP A BAASH-ROSS PACKING

OVERSHOT

IN THE RIG

A husky overshot that seals the wash string to the fish making it possible to pump circulating fluid thru the fish. A tool that should not be considered an emergency tool, but hung in the rig as regular equipment. When needed it will save time, labor, money and possibly the entire well. Many jobs have been circulated loose with the Baash-Ross Packing Overshot after being under pressure to 1200 pounds from 12 to 24 hours.

Don't wait until the mud has settled until it is impossible to break through—put a Baash-Ross Packing Overshot in the rig now and be prepared. Made to run in any casing size and to catch any size of drill pipe.

BAASH-ROSS TOOL COMPANY

5512 BOYLE AVENUE PHONE MIDLAND 2171

LOS ANGELES CALIFORNIA

BRANCHES

LONG BEACH • • • BREA • • • VENTURA • • • TAFT • • • ROSECRANS

HOUSTON, TEXAS

Steel Castings for Oil Field Service

EVANSteel is a special electric furnace alloy steel with great strength and endurance made for oil field equipment subject to severe strain and hard usage. It is particularly suitable for high pressure fittings and for tools and other castings that must resist shock and wear.

EVANSteel Castings are made under the closest chemical and metallurgical supervision by experienced foundry men using the best modern foundry methods for production and quick delivery.

Send blue prints for counsel or estimates.

CHICAGO STEEL FOUNDRY COMPANY

DAVID EVANS, President

Kedzie Ave. and 37th St.,

CHICAGO, ILLINOIS

GEO. N. BELSER
Tulsa, Oklahoma

See our exhibit at the International Petroleum Exposition.

EVANSteel Electric Furnace CASTINGS

Below are some EVANSteel fittings for high pressure service in the oil fields. Electric furnace alloy steel, electrically baked cores, and electric heat treatment produce EVANSteel castings that are equal to any oil field service.

O&GJ 9-22 Gray

Approved for Field and Refinery Service

Stanley

Solid Woven Cotton Belting

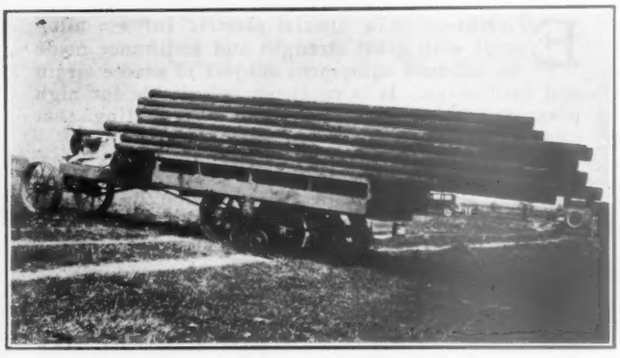
Made in accordance with tentative A. P. I. Specifications. Used throughout the oil fields of the world.

Space 33, Texas Building,
International Petroleum Exposition

Meet MR. C. E. HATHAWAY
MR. JAMES T. SULLIVAN
MR. W. R. TUCKER

STANLEY BELTING
MADE IN SCOTLAND

Ohio Tracktruck



For Oilfield Transportation

where the going is hard. CAPACITY TEN TONS. Over ten square feet of traction and load carrying surface. Powered by the sturdy Fordson.

Manufactured by

The Traction Machine Company
North Baltimore, Ohio

well. The Texas Companys No. 2 Beatty, Nich Kelly Survey, 150 feet to northeast and southeast lines, at 2,008 feet is in top of Serpentine, blew out; No. 3 Beatty, Nich Kelly Survey, 150 feet to southeast and southwest lines, has derrick up; No. 1 Lackey, Nich Kelly Survey, 150 feet to northeast and northwest lines, is drilling at 1,000 feet in shale; No. 2 Lackey, Nich Kelly Survey, 450 feet to northeast and 150 feet to northwest lines, is rigged up; No. 3 Lackey, Nich Kelly Survey, 750 feet to northeast and 150 feet to northwest lines, topped chalk at 2,145 feet and is standing. The Texas Company & Humble Co.'s No. 1 Clingensmith, Squire Damon Survey, offsetting discovery well and 150 feet to southwest line, topped Serpentine at 2,175 feet and is setting casing; No. 2 Clingensmith, Squire Damon Survey, 150 feet to southwest line of survey and 300 feet southeast of No. 1, at 2,056 feet topped Serpentine and is setting casing at 2,043 feet; No. 3 Clingensmith, Squire Damon Survey, 300 feet southeast of No. 2 and offsetting The Texas Company's No. 1 Lackey, topped Serpentine 1,966 feet, total depth 2,080 feet. William F. Morgan, Inc.'s No. 1 Osteen, W. C. Swearingen Survey, 150 feet to northwest lines of survey and 150 feet to southwest lines of lease, at 2,217 feet is bailing some oil, test not complete; No. 1 Moore, G. Jasper Gilbert Survey, 150 feet to northwest line of lease and 150 feet to center of northwest line of tract is in chalk at 2,207 feet, total depth 2,222 feet may drill to Edwards, shut down at this time. Weinert and others No. 1 Taylor, George W. James Survey, 150 feet to northeast line of survey, is drilling at 1,450 feet.

Luling Field

Magnolia Petroleum Co.'s No. 15 G. Proctor, J. Henry Survey, NE cor., is rigged up. North & South's No. 1 Kelly is drilling at 7,114 feet in schist; No. 2 Tiller is drilling in schist at 6,615 feet.

Kingsville Field—Kleberg

Houston Oil Co.'s No. 1 Kissman, Section 41, Block 9, total depth 3,200 feet is plugging back to test sand at 1,950 feet. Humble Oil & Refining Co.'s No. 2 Sexauer, Section 41, Block 11, located 200 feet to south line and 100 feet to east line, at 1,957 feet mudded off and well is under control.

Adams Gas Field—Medina

Mid-Kansas Oil & Gas Co.'s No. 1 Nixon Survey 13 3-4, at 500 feet to west line and 537 feet to north and south lines, has set 10-inch surface casing at 60 feet; No. 2 Nixon, Survey 13 3-4 is location. Witherspoon Oil Co.'s No. 1 Fasseler, Survey 799, located 550 feet to east line and 1,350 feet to south line, is setting casing at 924 feet.

Nueces County

Sexat Oil Co.'s No. 4 Dunn, 300 feet from south line of tract, is coring at 3,500 feet; No. 2 Weil, is shut down at 2,360 feet.

Refugio Gas Field—Refugio

Houston Gulf Gas Co.'s No. 3 W. Heard, has set 10-inch surface casing at 400 feet; No. 2 Moody is drilling at 1,450 feet. Houston Oil Co.'s No. A-2 Rooke, is drilling at 2,600 feet; No. 10 F. Heard at 2,230 feet blew out and ran wild for a week, estimated at 30,000,000 feet of gas, which has been turned into line, and will be completed after pressure goes off.

SOUTHWEST WILDCATS

(Continued from Page 74)

No. 1 Ball, Survey 16, at 450 feet to north and 150 feet to east line, is building roads to location.

Jim Hogg County

Paizano Oil Syndicate's No. 1 Campbell, Las Vivoritas grant, has set casing at 1,500 feet. Hamilton and others' No. 1 Holbien, Block 44, is preparing to resume drilling at 2,080 feet.

Starr County

Harston and others' No. 1 H. Guerra, Survey 43, at 2,400 feet to south line and 2,000 feet to west line, is rigging up. Milham Corp.'s No. 2 Salinas, Porcion, 111, is standing at 5,033 feet in blue shale.

Bexar County

A. R. Beal trustee's No. A-1 Ackerman, Survey 133 1-2, is standing at 910 feet in Austin chalk. Allen Burnam's No. 1 Ward, A. A. Gardiner Survey, is drilling. Humble Oil & Refining Co.'s No. 2 Yturri, A. Stafford Survey, 2,200 feet to west line and 750 feet to south line, is drilling at 1,200 feet.

Bee County

D. Hewitt's No. 1 G. A. Ray 1½ miles northeast of Pettus, is drilling at 1,800 feet. Nichols & White's No. 1 Hicks, Block 19, NW cor., is standing at 1,408 feet. Red Ant Oil & Gas Co.'s No. 1 Perry & Chesnut, B. Q. Hadley Survey, 1,600 feet to south line and 450 feet to east line of farm, has set surface casing at 240 feet, with gas showing at 145 feet.

Caldwell County

Calco Petroleum Co.'s No. 2 Thomas, 600 feet southeast of No. 1 chalk topped at 1,780 feet, total depth 1,820 feet is shut down. Ratcliffe's No. 1 J. L. New, James Hindes Survey, 150 feet to west line and 600 feet to south line, is trying to core at 2,500 feet. Sutton & Smith's No. 1 Carter, G. Hindes Survey, 150 feet to CNL, is standing at 2,597 feet; No. 2 Carter is location 300 feet east of the No. 1.

DeWitt County

Empire Southern Oil Co.'s No. 2 Smith, Survey, 3, three-quarter mile west of No. 1 is drilling at 3,000 feet. McNeil & Matthews' No. 1 Kaiser, A. Dillard Survey, 1,508 feet to NW cor., is coring at 3,939 feet. Williams & Gates' No. 1 Gohmert, G. W. Brooks League, 175 feet to north line and 300 feet to east line, is standing at 760 feet.

Dimmitt County

Humble Oil & Refining Co's No. 1 City National Bank, Survey 654, 700 feet to north line and 2,000 feet to east line, is drilling at 3,270 feet.

Fayette County

Magnolia Petroleum Co.'s No. 1 Fordtran, J. R. Jones Survey, 200 feet to northeast lines and 1,050 feet to west lines, is drilling at 3,734 feet.

Goliad County

Houston Oil Co.'s No. 1 Lott, G. Cortinas Survey, 2,000 feet to north line and 300 feet to west line, is testing at 2,902 feet; No. 4 Pettus, P. Trevino Survey, 1,200 feet southwest of No. 2, is rigged up. C. W. Simpson's No. 1 Ideus, W. H. Pendleton Survey, 156 feet to north line and 540 feet to west line, is drilling at 920 feet.

Gonzales County

Dunning & Pierce's No. 1 Wilkerson, R. Ward Survey, 150 feet to CNL, is drilling. L. L. Jones' No. 1 Campbell, & Development Co.'s No. 1 Preston, Pace Moore & Bridges Survey, SW cor. Spudded in 100 feet and shut down. Martin Oil League, at 1,576 feet is bailing, showing some oil and gas. The Texas Company's No. 2 Plowman, Byrd Lockhart Survey, is drilling at 93 feet; No. 3 Plowman, Byrd Lockhart Survey, is location 2,640 feet southeast of No. 1.

Karnes County

Maurer & Ellis' No. 1 Henke, 500 feet south of railroad and 600 feet to east line, is drilling at 1,700 feet. Reynosa Oil Corp.'s No. 2 Butler, Block 43, is deepening from 1,947 feet.

Kinney County

Havelin Oil Co.'s No. 1 Weatherby, Section 21, Block 5, is drilling at 4,365 feet (corrected depth). W. A. Stephens and others' No. 1 Clamp, Survey 346, is shut down at 1,070 feet for water.

Lavaca County

M. L. Benedum's No. 1 Russek, J. G. Reynolds Survey, Block 38, at 1,060 feet to west line and 210 feet to south line, is drilling at 3,200 feet.

Live Oak County

Delta Oil Co.'s Inc., No. 1 McNeil, Jane Curry Survey, 4,000 feet to NE cor. and 3,000 feet to northwest line, is drilling at 1,010 feet. Houston Oil Co.'s No. 19 Cartwright, W. J. Cannon Survey, 1,500 feet northeast of No. 17, is rigged up. R. P. Lightfoot's No. 1 Thomas, Survey 963, Block 19, west central is at 1,316 feet. Simmons Oil Co.'s No. 4 Sartain, Simms tracts, is shut down at 2,303 feet to change rigs to go to 3,000 feet. J. W. Walton's No. 1 Roberts, west of Three Rivers, is pulling casing at 1,816 feet.

Medina County

California-Medina's No. 1 Rothe, Sur-

ONLY THE BARBER-GREENE HAS THE VERTICAL DIGGING BOOM AND THE OVERLOAD RELEASE

Marching Through the Oil Fields

PAST oil derricks, over hills, across prairies, through soft ground, rocky ground and frozen ground—everywhere there's pipe line trench to dig, Barber-Greene Ditchers are marching through to new records.

With speed as high as 6200 feet of trench per day and costs lower than you've ever thought possible Barber-Greenes are showing pipe line contractors and oil companies something new and previously unheard-of in ditcher performance.

And such performance is made possible by the three features that have made Barber-Greene famous—the Vertical Boom that digs straight down, the Overload Release that prevents underground hazards from harming the machine, and the full-length crawlers that march straight down the digging line.

Partial List of Users

Standard Pipe Line Co.
Pacific Oil Company
Louisville Gas and Electric Co.
Lone Star Gas Company
Latex Construction Co.
Houston Nat. Gas Co.
Arkansas Nat. Gas Co.
Panhandle Construction Co.
Gulf Pipe Line Co.
Upham Gas Co.
Empire Pipe Line Co.
Producers and Refiners Corp.
Atex Construction Co.
Cocke and Turner
Sinclair Texas Pipe Line Co.
Southwestern Gas & Electric Co.
Rich & Company
Prairie Oil & Gas Co.
J. C. Connor & Sons
Union Oil Co.

BARBER-GREENE COMPANY, 600 WEST PARK AVENUE, AURORA, ILLINOIS

Barber-Greene

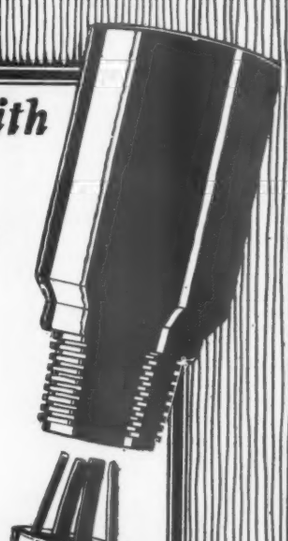
Barber-Greene Ditcher

Representatives in 50 Cities

DISC FEED LOADERS VERTICAL BOOM DITCHERS
STANDARDIZED PORTABLE AND PERMANENT BELT CONVEYORS
SNOW LOADERS CAR UNLOADERS COAL LOADERS

Always!

Better, Cleaner Cores--Lowest Cost Per Foot With ELLIOTT-ALCO TWO-PIECE CORE DRILL



Not now and then—not only under favorable conditions—but ALWAYS, in any formation and under all conditions of operation the Elliott Alco Two-Piece Core Drill consistently recovers the most informative cores at the lowest recorded cost per foot of core recovered.

The design, principles of construction and materials embodied in the Elliott-Alco, contribute to its consistent performance and unvarying economy wherever used.

Performance data is available at any time. Our consulting engineers and coring specialists are at your service. Command us.

ELLIOTT CORE DRILLING CO.
850 Subway Terminal Building
LOS ANGELES, CALIFORNIA

BRANCHES:
3210 Harrisburg Blvd., Houston, Texas
618 Lake Street, Shreveport, La.
432 Park Street, Beaumont, Texas
123 East 3rd Street, Tulsa, Okla.

EXPORT OFFICE:
150 Broadway, New York

For Refinery Blow-off Service

HOVALCO BLOW-OFF VALVE

Simple design — rigid construction — monel seats easily reground, reversed or renewed.

Homesteads are "OK" says a "Standard" Chief Engineer

One of the Standard Oil Companies, through the medium of their Chief Engineer, had this to say of the two valves shown here. Both types had been handling their jobs for two years before this "O. K." was received.

Wherever there is a hard job in the refinery or its power plant, there is a Homestead valve to lick it and keep it licked. Ask any refinery engineer who has had his share of valve grief—and who has given a Homestead valve the chance to make good.

These are some of the Refinery Applications of Homestead Valves

High Pressure Valves;	Boiler and Blow-Off Valves;	Receiving Station and Pump House Manifold Valves;
High Temperature Valves;	Still Valves;	
Acid Resistant Valves;	Tar Line Valves;	Gasoline and Kerosene Line Valves.
Vacuum Valves;	Gas Drip Valves;	

Homestead Valve Manufacturing Company, Homestead, Pa.

HOMESTEAD VALVES

QUARTER TURN VALVES: STRAIGHT WAY, THREE WAY, FOUR WAY, LUBRICATED TYPE, ROUND OPENING REFINERY
PROTECTED SEAT VALVES: HYDRAULIC (R.D.C. PAT.) OPERATING, REMOTE CONTROL GLOBE, ROSS AIR SHUT-OFF VALVE, HOVALCO BLOW-OFF VALVE

Fig. 62

HOMESTEAD QUARTER TURN VALVE

Many refiners use this semi-steel valve where brass is not required—meets A. S. M. E. and State Laws on boiler blow-off service.

34 Years of Steadfast Quality in Valves

Write for our complete catalogue.

vey 1,012, is shut down at 3,270 feet. Medina Oil Co.'s No. 1 Taylor, Survey 135, is drilling at 1,230 feet. R. P. O'Brien's No. 1 Nixon, Survey 531, is cleaning well, total depth 1,007 feet. Cecil Switzer's No. 1 Zerr, Survey 459, has resumed drilling at 3,485 feet.

Maverick County

Ryan Consolidated Petroleum Co.'s No. 1 Indio, Survey 14, center, is drilling at 1,733 feet. Rycade Oil Co.'s No. 1 Chittim, Section 129, Block 7, has most of drill stem out of hole, depth 5,630 feet; No. 2 Chittim, Section 158, Block 7, located 350 feet to NE cor,. is drilling at 250 feet with oil showing reported at 143 feet; No. 2 Sullivan is drilling at 5,004 feet.

McMullen County

Houston Gulf Gas Co.'s No. 2 Fisher, located 600 feet west of Frio River and 1,700 feet south of No. 1, is location. Simmons Oil Co.'s No. 2 Reagan is location. Nelson & Woods' No. 1 Shiner, Survey 48, Block 74, at 1,000 varas to east line and 350 varas to south line, is standing at 1,750 feet. George Pickett's No. 1 Jacob, Survey 7, located 660 feet CNL, is standing at 3,030 feet.

San Patricio County

Huber & Crawford's No. 1 Mathis, Delgavo Survey, Block 17, at 300 feet to northwest lines and 2,500 feet to southwest lines is shut down at 2,516 feet. Mission Drilling Co.'s No. 1 Harwood, SE cor. of tract, has set and cemented surface casing at 400 feet. National Oil Co.'s No. 1 J. E. Sullivan, J. C. McMullen Survey, 500 feet to SW cor., has set surface casing at 280 feet. George B. Pickett's No. 1 well has been spudded in. Sexat Oil Co.'s No. 9 Rachel is drilling at 1,400 feet; No. 12 Rachel is rigged up. John Sigmund's No. 7 Wallace Robinson is fishing at 4,012 feet. J. E. Walsh's No. 1 J. E. Walsh, George Paul subdivision, Block 45, SW cor., has spudded in.

Victoria County

Valley Oil Co.'s No. 1 Stoever, Survey 9, T.&N.O. Survey, 500 feet to SE cor., is drilling at 718 feet in gumbo.

Val Verde County

Crusoe Williams' No. 1 Holman, Section 5, Block N, is shut down at 2,910 feet for 8¼-inch casing. Douglas Oil Co.'s No. 1 Sellers, Section 82, Block A, is straightening, total depth 3,020 feet. East Del Rio Oil Co's No. 1 Russell, Section 183, is straigh.reaming at 3,190 feet. Independent Operators' No. 1 Whitehead, Survey 30, Block 4, is drilling at 3,925 feet. Magnolia Petroleum Co.'s No. 1 Whitehead, Survey 81, G.S.&S.F. Survey, is in shale at 3,570 feet with 6-inch casing set at 3,525 feet. O. O. Owens and others' No. 1 Mills, Section 128, Block 1, is shut down at 2,820 feet in shale showing 500,000 feet of gas.

Wilson County

Thomas and others' No. 1 Aug. Haese, Survey 124, located 300 feet to NE cor., is testing at 2,357 feet in the Edwards.

Zavala County

J. G. Pundt's No. 1 West, Fuentes Survey, NW cor., and east of Uvalde, is setting 8¼ inch casing at 936 feet to test. B. F. Thompson's No. 1 West, northern part of county, is shut down at 228 feet for water.

LOUISIANA-ARKANSAS

(Continued from Page 72)

ing below 350 feet. Tubbs and associates have started operations in No. 1 Hines, Section 9-14-16, and are drilling below 50 feet. A rig has been up for this test since April. Bethany Oil & Gas Co.'s No. 1 Offenhauser, Section 1-20-16, is to be put on the pump. It tested a show of oil at 2,252 feet and now is at a total depth of 2,270 feet. W. W. Dobson is testing a sand encountered at 1,865-66 feet in No. 6 Rives, Section 5-20-16. Falcon Drilling Co. has cemented 6-inch casing at 2,148 feet in No. 1 Schmidt, Section 27-20-15. J. B. Files has abandoned No. 1 Payne, Section 35-23-16. It has been shut down since March at a depth of 925 feet. No test was made. T. D. Gray and associates are to test a formation at 1,966 feet in No. 1 Hart, Section 29-21-16. D. S. Richardson estate's No. 5 Youree-Randolph, Section 13-20-15, is down 2,103 feet where 6⅝-inch casing has been cemented. Standard Oil Co.'s No. 189 Stiles, Section 27-21-16, is drilling shale at 134 feet. Superior Oil Co. has cemented 6-inch casing at 2,220 feet in No. 6 Youree, Section 26-20-15.

La Salle Parish

B. Hunt has started drilling in No. 6 Urania, Section 7-10-2e, Urania Field, and already has reached a total depth of 1,390 feet. Natural Gas & Fuel Corp. has a 40-bbl. flowing well in No. M-11 Urania, Section 20-10-2e, which has been completed in a sand at 1,540-50 feet. Wingfield and associates' No. 2 Gibson, Section 2-9-1e, is drilling shale at 2,880 feet. This is a deep test in the Urania Field.

Monroe District

Falcon Drilling Co. has abandoned No. 1 Gladney, Section 5-21-7e, Morehouse Parish, junking the drill stem stuck in the hole at 2,958 feet. W. C. Feazel has cemented 6-inch casing at 2,093 feet in No. 1 Faulk, Section 15-20-4e. The Texas Company's No. 1 Siveley, Section 22-20-6e, is drilling at 2,651 feet.

In Ouachita Parish, C. W. Frierson has cemented 8-inch casing at 812 feet in No. 1 Feazel, Section 17-19-4e. J. S. Gould has cemented 8¼-inch casing at 2,228 feet in No. 1 Grayling, Section 11-15-2e. Hatcher & Evans have a derrick up for No. 6 Hatcher, Section 16-19-4e. Industrial Gas Co. has cemented 8-inch casing at 840 feet in No. 2 Sullivan, Section 5-18-4e. Jordon Drilling Co. has abandoned as dry at 2,710 feet No. 2 Fudican, Section 25-18-4e. Ladell Properties, Inc., is down 1,300 feet in No. 44 fee, Section 6-19-5e. Ouachita Natural Gas Co. is fishing drill stem lost in the hole at 2,780 feet in No. 2 D'Arbonne, Section 25-19-2e. This company has a 12,000,000-foot gasser in No. 4 Leiber, Section 3-19-4e, which has been completed in sand at 2,148 feet.

In Union Parish, Southern Carbon Co. has started drilling in No. 1 Harris, Section 20-20-4e. This company's No. 1 Jackson, same section, is down 2,096 feet where 6-inch casing has been cemented.

Webster Parish

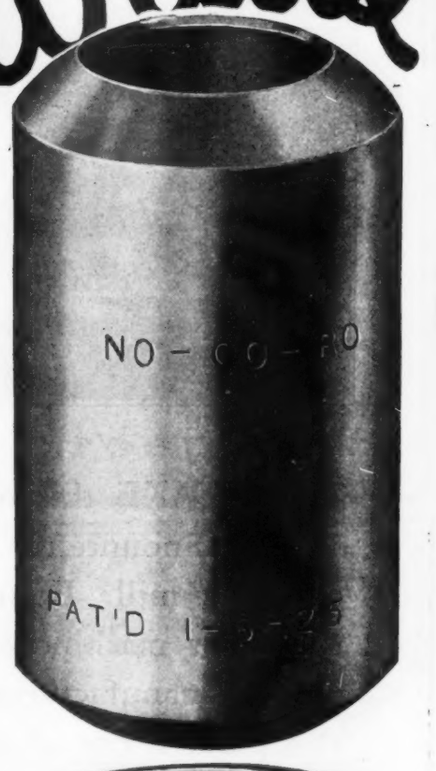
Crusaders Oil & Producing Co. is drilling at 1,914 feet in No. 18 Hope, Section 24-21-10. Magnolia Petroleum Co. is down 50 feet in No. 1 D. G. Cox, Section 22-21-10. This is to be a deep test. This company's No. 3 Cox, Section 23-21-10, is drilling anhydrite at 4,254 feet. Magnolia Petroleum Co.'s No. 3 Marshall, Section 21-21-10, is being bailed for a test of a sand at 2,546-61 feet. This company is rigging up for No. 5 on the same lease. No. 1 Waller-O'Brien, Section 32-23-9, Sarepta district, is drilling at 1,950 feet. R. W. Norton has gone into an old well, No. 1 Josey & Massey, Section 27-21-10, and is drilling deeper at 4,560 feet. Ohio Oil Co. is drilling chalk rock at 2,253 feet in No. 4 Holloway, Section 23.

ARKANSAS

Smackover Field

In the Norphlet district, Lion Oil & Refining Co. is drilling at 1,850 feet in No. 7 Hays, Section 4-16-15. Magna Producing Co. has encountered an oil sand at 2,467-69 feet in No. 1 Murphy, Section 15, and is waiting on a standard pumping rig. The hole has 1,600 feet of fluid standing. Magnolia Petroleum Co. is to make a test of a broken formation at a total depth of 2,688 feet in No. 3 Murphy, Section 8. Southern Crude Oil Purchasing Co. is to plug back. No. A-5 Wells, Section 15, after getting a salt water well at a depth of 2,594 feet. Standard Oil Co. is rigging up to deepen No. 33 Murphy, Section 4. Unity Petroleum Co.'s No. 12 Roper, Section 3, is drilling at 2,027 feet. All these tests are in Union County. On the Ouachita County side of the field, Owenwood Oil Corp. has abandoned No. 7 Snyder, Section 34-15-15, after encountering salt water at 2,665 feet. In the Louann district, National Consolidated Petroleum Corp. has cemented 6-inch casing at 2,623 feet in No. 1 Fagg, Section 8-16-16. Total depth of the hole is 2,642 feet. The Texas Company's No. 1 Davisson, Section 26-15-16, tested 1,400 feet of salt water from sand at 2,275-83 feet with a sand testing de-

...here precision prevails



One of the Chief Reasons for the Almost Unbelievable Records the DROP & Seat is Making

A Kansas user of No-Co-Ro DROPS & Seats (name on request) just reports 36 months' service in a well in which the balls and seats were changed *every month.*

While such service is due primarily to *design,* materials and workmanship also play an important role. The metal in No-Co-Ro DROPS & Seats is specially prepared according to an exacting formula. It combines amazing hardness with equally amazing resistance to shock. It will not pit, chip or corrode even under the most adverse conditions.

Machining and heat treating are done under the personal supervision of officials with 35 years' experience to guide them. Throughout the process of manufacture, precision prevails!

That is why we are able to guarantee every No-Co-Ro DROP & Seat to outlast and out-perform any two balls and seats you have ever used.

NORRIS BROTHERS, Inc.

Robinson, Illinois, and Fort Worth, Texas

No-Co-Ro Balls & Seats are Guaranteed to Outlast the Best Balls & Seats You Have Ever Used.

SOUTHERN MILL AND MANUFACTURING COMPANY

WE TAKE this opportunity to announce the opening of our new mill. Equipped with the latest machinery and most modern manufacturing facilities, this plant is one of the finest in the entire Southwest.

To those attending the International Petroleum Exposition we extend a cordial invitation to watch the various stages in the manufacture of our Sectional Houses.

SOUTHERN MILL & MFG. CO.

515-525 S. Troost

TULSA,

OKLAHOMA

vice. The former is in Union County and the latter in Ouachita County.

Stephens Field

Brewer and associates' No. 1 Curry, Section 32-15-19, is drilling at 1,100 feet. This is the only drilling test in the field.

Nevada County

Autrey Oil Co. has a 125-bbl. well in No. A-3 Martin, Section 6-14-20, which has been completed pumping from sand at 1,170-76 feet. On the same lease, this company's No. C-1 has a sand at 1,188-1,207 feet and is waiting to be put on the pump. A derrick also is up for No. C-2 Martin. In the section to the west, Section 1-14-21, J. J. O'Brien got a 150-bbl. pumper in No. B-4 Moss. His No. B-12 Moss, same section, also is ready to be put on the pump with a sand at 1,168-77 feet. No. B-5 Moss has casing cemented on top the producing sand at 1,156 feet. On the Haynie lease, same section, this operator also has another test down 1,156 feet where the 6-inch casing has been cemented. Humble Oil & Refining Co.'s No. 1 Fairchild, Section 6-14-20, an offset to the Haynie test, has 6-inch casing cemented at 1,187 feet. Burnham and associates are rigging up for a test on the McKinney farm, Section 9-14-21. In Section 10, Ames & Zing have a test waiting to be put on the pump with a sand at 1,212-15 feet. This is their No. B-1 Wommack.

OKLAHOMA FIELDS

(Continued from Page 68)

tary rig for No. 2 Milner, SW cor. NE SE, Section 17-5-8. Louisiana Oil Refining Co. has the rig up for No. 5 Perry, SW cor. SE NW, Section 20-5-8. Jack Kilgore and others made location for No. 1 Smith, NW cor. NE, Section 29-5-8. American Oil & Gas Co. has the rig up for No. 1 Sales, SE cor. NW, Section 10-4-6. Ada Development Co.'s No. 7 Lloyd, SE cor. NW NE, Section 6-3-7, has been abandoned at 430 feet.

Hughes County

The Prairie Oil & Gas Co. has the rig on the ground for No. 4 Hampton, NE cor. NW NW, Section 20-8-10, Yeager Pool.

Pottawatomie County

Continental Oil Co. has the rig on the ground for No. 3 Doyle, NE cor. SW, Section 19-7-4, Pearson Pool. Pure Oil Co. has the rig on the ground for No. 5 Doyle, SE cor. NW NW, Section 30-7-4.

Gypsy Oil Co.'s No. 1 Doebling, SW cor. SW, Section 4-9-5, Earlsboro Pool, was abandoned at 4,595 feet with a hole full of water. Independent Oil & Gas Co.'s No. 5 Knapp, SW cor. SE NE, Section 8-9-5, a rig, has been abandoned. Mid-Continent Petroleum Co.'s No. 7 McKinley, SW cor. NE SW, Section 9-9-5, was completed for 370 bbls. in the Wilcox sand 4,423-32 feet. Tidal Oil Co.'s No. 6 Watkins, SE cor. NE NW, Section 9-9-5, was completed for 200 bbls. in the Wilcox sand 4,290-4,313 feet. Continental Oil Co.'s No. 2 Doyle, SE cor. NE SW, Section 19-7-4, made 20 bbls. in the Hunton lime 3,746-3,810 feet.

Pierce Oil Corp.'s No. 1 Bickford, NW cor. NE NE, Section 30-7-4, Pearson Pool, has been shut in for 11,000,000 feet of gas in the Hunton lime 3,749-4,095 feet. Magnolia Petroleum Corp.'s No. 1 Hembree, NW cor. SE, Section 19-7-5, was completed for 64 bbls. on the pump, coming from Simpson formation 3,979-4,035 feet.

Seminole County

The Texas Company made location for No. 1 Osborne, NE cor. NW SW, Section 4-9-6, Searight Pool. Jarvis & Holm dug the cellar for No. 1 Butner, NE cor. SW SW, Section 10-9-8. Sinclair Oil & Gas Co. made location for No. 7 C. Jones, NE cor. SE, Section 9-8-6, Bowlegs Pool. Pure Oil Co. is building the rig for No. 3 Strothers "F", NE cor. SE NW, Section 10-8-6. Pure Oil Co. made location for No. 3 Hull, SW cor., Section 35-8-6, Little River Pool. The Prairie Oil & Gas Co. has the rig up for No. 6 C. Graham, SE cor. NW SE, Section 3-9-5. Location was made for No. 7 George Jones, NE cor. NW SE, Section 11-8-6, Bowlegs Pool. Location for No. 8 George Jones, was made NW cor. NW SE, Section 11-8-6.

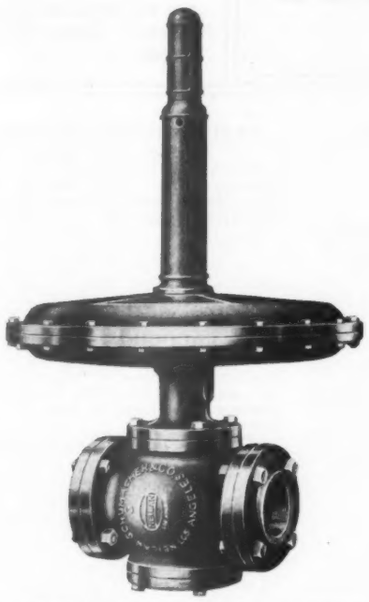
The Prairie Oil & Gas Co.'s No. 9 Kinkade, NW cor. NW SE, Section 33-10-6, in the Searight Pool, has been abandoned at 2,750 feet. No. 2 Houck, NE cor. SW, Section 33-10-6, has been abandoned at 2,712 feet. The Texas Company's No. 5 Jackson, NE cor. NW, Section 4-10-8, was completed for 100 bbls. from the Wilcox sand 4,105-47 feet. Barnsdall Oil Co.'s No. 3 Brown, SW cor. NE NW, Section 10-9-5, Earlsboro Pool, had an initial production of 1,658 bbls. from the Wilcox sand 4,275-4,301 feet. No. 2 Pack, NW cor. SE SE, Section 10-9-5, swabbed 307 bbls. from the Wilcox sand 4,397-4,402 feet. The Texas Company's No. 2 Wilmott, NE cor. SE, Section 10-9-5, was completed for 90 bbls. in sand 3,544-3,600 feet. Gypsy Oil Co.'s No. 3 B. Carter, SW cor. NW NW, Section 11-9-5, had an initial flow of 3,830 bbls. from the Wilcox sand 4,360-73 feet. Carter Oil Co.'s No. 3 Paine, NE cor. NW SE, Section 12-9-5, made 1,645 bbls. from the Wilcox sand 4,297-4,304 feet. Amerada Petroleum Corp.'s No. 1-A Anderson, NW cor., Section 15-9-5, is dry and abandoned at 4,461 feet. Barnsdall Oil Co.'s No. 2 Hearn, NW cor. NE NE, Section 15-9-5, is a dry hole at 4,370 feet. Wilcox Oil & Gas Co.'s No. 4 Cluck, SW cor. NW NE, Section 4-9-6, Searight Pool, has been completed for 510 bbls. in the Wilcox sand 4,338-4,408 feet. Carter Oil Co.'s No. 1 Grisso, SE cor. Section 15-9-6, made 540 bbls. initial by swabbing, producing from the Wilcox sand 4,215-38 feet. No. 2 Pounder, NW cor. SE SE, Section 34-9-6, swabbed 10 bbls. from the Wilcox sand 4,135-52 feet. Empire Gas & Fuel Co.'s No. 4 Wilson, SW cor. NW NE, Section 34-9-6, Seminole Pool, is dry and abandoned at 4,557 feet. T. B. Slick's No. 1 Tiger, NW cor. NE NW, Section 1-8-6, was completed for 115 bbls. in the Wilcox sand 4,135-50 feet. The Texas Company's No. 3 Strothers, NE cor. NW NW, Section 2-8-6, is a dry hole in the Wilcox sand 4,440-63 feet. No. 11 Reed, NW cor. NE, Section 14-8-6, is dry at 4,315 feet. McCulloch Oil Co.'s No. 3 Bowlegs, SW cor. NW NW, Section 22-8-6 Bowlegs Pool, had an initial production of 455 bbls. from the Wilcox sand 4,395-4,401 feet.

Carter Oil Co.'s No. 12 Wise, SW cor. NE, Section 23-8-6, had an initial flow of 1,325 bbls. from the Wilcox sand 4,220-45 feet. Blackwell Oil & Gas Co.'s No. 6 Nitey, SW cor. NE SE, Section 35-8-6, was completed for 4,591 bbls. in the Wilcox sand 4,124-26 feet. Mid-Continent Petroleum Corp.'s No. 2 Wadsworth SE cor. SW SW, Section 36-8-6, Little River Pool, had an initial production of 3,865 bbls. from the Wilcox sand 4,301-05 feet. Indian Territory Illuminating Oil Co.'s No. 1 Jackson, NW cor. SW NW, Section 1-7-6, was completed for 2,964 bbls. in the Wilcox sand 4,194-95 feet. No. 1 Reed, SE cor. NW NW, Section 1-7-6, made 3,298 bbls. from the Wilcox sand 4,159 feet. No. 2 Nitey, SE cor. NE NE, Section 2-7-6, made 3,154 bbls. from the Wilcox sand 4,121-22 feet. Gypsy Oil Co.'s No. 1 Barkus, NE cor., Section 20-7-7, is a dry hole at 4,737 feet. The Prairie Oil & Gas Co.'s No. 4 Stidham "B", NE cor. SE NE, Section 11-9-5, Earlsboro Pool, was completed for 2,000 bbls. in the Wilcox sand 4,333-47 feet. No. 7 Stidham "B", NW cor. SE SE, Section 11-9-5, made 1,940 bbls. from the Wilcox sand 4,356-75 feet. No. 40 Graham, SE cor. NW NW, Section 10-9-5, came in for 1,400 bbls. in the Wilcox sand 4,270-76 feet. No. 2 Mason, NE cor. NW SW, Section 36-9-6, Seminole Pool, has been abandoned at 4,203 feet.

Stephens County

Magnolia Petroleum Corp.'s No. 3 Harpe, CNL NW NE, Section 29-1s-9w, an old well deepened, has been shut in for 1,000,000 feet of gas from sand 2,188-93 feet. Magnolia Petroleum Corp.'s No. 5 Morgan, CNL NE SE, Section 32-1-8w, an old well deepened, has been completed for 3,000 feet of gas in sand 2,388-94 feet. No. 3 Charleston, SW cor. NW SW, Section 32-1-5w, has been abandoned at 2,785 feet. Skelly Oil Co.'s No. 1 Inscore, NE cor. SE, Section 24-1s-4w, is making 75 bbls. from a series of sands

(Continued on Page 356)



Neilan Vapor Recovery Relief Valve

Maintains Atmospheric Pressure and Prevents Pulling Vacuum on Tanks

Designed for Vapor Recovery Systems, removing vapors from flow tanks, run tanks and storage tanks.

The Neilan Vapor Recovery Relief Valve will maintain atmospheric pressure, or any pressure up to 4 ounces, accurately and dependably. When it is set for atmospheric pressure the valve will open at ¾-inch water pressure, and will close promptly when the vapors have been removed and the pressure goes back to atmosphere.

It is extremely sensitive, accurate, simple and reliable. All working parts are enclosed. The adjustment is simple. There are no stuffing boxes or dash pots. It absolutely will not chatter or pulsate - - being prevented from doing so by a cushioning device in the lower diaphragm chamber.

Constructed of materials that will resist the corrosive action of hydrogen sulphide gas, and other sulphur compounds. Ask for detailed information.

Neilan, Schumacher & Co.

641-651 Santa Fe Ave., Los Angeles, Calif.

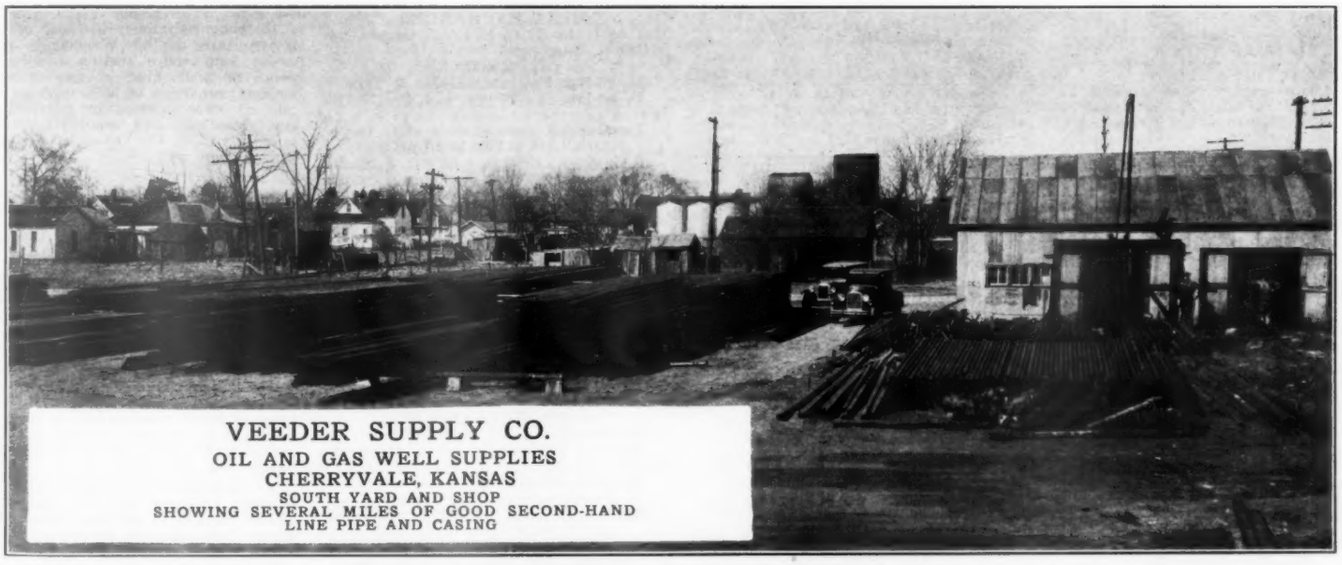
Branch: 307 East 4th St., Tulsa, Okla., P. H. Winkinson, Mgr.

REPRESENTATIVES:
Maintenance Engineering Corp.,
2000 Harrington Street,
Houston, Texas

NEILAN

Pelican Well Tool & Supply Co.,
Shreveport, La.

"You Can Be Sure of Neilan Products"


VEEDER SUPPLY CO.
OIL AND GAS WELL SUPPLIES
CHERRYVALE, KANSAS
SOUTH YARD AND SHOP
SHOWING SEVERAL MILES OF GOOD SECOND-HAND
LINE PIPE AND CASING

VEEDER SUPPLY CO.

Oil and Gas Well Supplies **Pipe Line Contracting**

Cherryvale, Kans. **P. O. Box 199, Phone L. D. 5**

35 CENTS a line first insertion; 25c a line each additional insertion. Cash in advance.

CLASSIFIED WANTS

CREATE AND BUILD BUSINESS

MAIL your advertisement now. It will be published next week. Cash with order.

FOR SALE—EQUIPMENT

REFINERY EQUIPMENT AT BARGAIN PRICES

From Sinclair Refinery at Vinita, Okla., and Kansas Oil Refinery at Coffeyville, Kans.

28—fire stills

6—Steam stills

40—Condenser boxes

15—Agitators

7—Dismounted car tanks

105—Storage tanks from 50 to 55,000-bbl. capacity

50—Steam pumps

20—Triplex pumps

1—7-ft.x60-ft. Rotary dryer.

300—Tons structural steel

300,000 Fire brick

4,000,000 Building brick

1—Complete lubricating plant (except chillers), used only about 18 months, including.

1—20-ton Carbondale absorption refrigerating plant.

2—48-in. Carbondale filter presses.

2—Allbright-Nell filter presses

Complete sweat pan house equipment.

10—5ft.x15-ft. filter tanks

Necessary pumps and accessories

15—Miles pipe; 2-in. to 8-in.

18—Grimes oil line pumps

—4¾-inx18-in. Pattin Bros. oil line pumps.

Complete detailed catalog upon request.

Inspection invited.

MACHINERY & SUPPLY CORPORATION

Box 616 Joplin, Mo.

BARGAINS FOR SALE

1—New No. 26 Star drilling machine, with 30 H.P. mounted boiler and complete set of tools.

1—No. 32 Steel Keystone drilling machine with 30 H.P. mounted boiler and complete set of tools.

1—No. 23 Star drilling machine with 25 H.P. boiler and complete set of tools.

1—No. 5½ Steam Keystone tractor drilling machine with complete set of tools.

1—D-Cyclone, gasoline, tractor drilling machine with complete set of tools.

1—No. 30 Special Sparta, gasoline, tractor drilling machine with complete set of tools.

One 1,200 bbl. steel riveted tank, knocked down.

2—Twin 25 H.P. Oil Well Supply Co. Oil engines, with 5x12 Oil Well Supply Co. belt driven Mud Hog pump.

One 5x12 Vogt Bros. steam pump.

One 350 barrel steel riveted agitator

THE TRACY SUPPLY CO., INC.,
Bowling Green, Ky.

FOR SALE—EQUIPMENT

5 Dean Triplex Pumps, 5 by 8.

1 No. 2, 1 No. 5, 1 No. 6, 2 No. 7, 1 No. 10, 1 No. 11, 1 No. 12 Sweetland Oil Filters.

Two 10-inch S. Roturbo Centrifugal Pumps. Six 10-inch S. Centrifugal Pumps. Steam Turbine.

Storage Tanks. Send for list.

Send us your inquiries.

We buy your surplus equipment.

CONSOLIDATED PRODUCTS CO.
15 Park Row N. Y. C. Barclay 0603.

FOR SALE—Two forty H. P. Superior Oil engines, reversible clutches, A-1 condition. Price on application. Box 660, Madison, Kans.

FOR SALE

Complete Standard drilling Rig. New Marion Rig Irons, new Boiler new drilling lines, drilling tools and fishing tools, everything needed to drill deep. Located in Western Kansas. Bargain for cash. Address Box C-11, The Oil and Gas Journal, Tulsa, Okla.

USED LINE PIPE AND CASING FOR SALE

7—25-Hp. used gas engines.
10—6-in. standard rigs.

15,000 ft. 5⅜-in. used casing.
15,000 ft. 6⅝-in. used casing.
10,000 ft. 8¼-in. used casing.
5,000 ft. 10-in. used casing.

75,000 ft. 3-in. used line pipe.
50,000 ft. 4-in. used line pipe.
20,000 ft. 6-in. used line pipe.
For immediate shipment from our Texas yards.

KEYSTONE PIPE & SUPPLY CO.
607 Holmes Bldg.,
Fort Worth, Tex.

FOR SALE OR RENT—Concrete mixers, hoist engines, air compressors, pumps, wheelbarrows, saw rigs, etc., Universal Supply & Machine Co., 201 S. Houston, Tulsa, Okla.

OIL TANKS AVAILABLE AT ST. LOUIS, MO.

12,000-bbl. steel tank, warehouse building and office; R. R. sidings; excellent facilities. For details address Box 1221, St. Louis, Mo.

FOR SALE—Plant of Dixie Gasoline Co. Located about 15 miles from Brownwood, Tex. Inventories may be seen at office of H. H. Barrett, trustee. P. O. Box 296, Brownwood, Tex.

FOR SALE—EQUIPMENT

BURNERS

Gas—Oil—Combination
MID-CONTINENT GAS APPLIANCE CO.,
Tulsa Trust Bldg., Tulsa, Okla.

FOR SALE

Two 190 horsepower Miller Gas Engines, one Westinghouse 150 K. W., one Morgan Gardner 150 K. W., one Triumph 125 K. W. Generators, complete with accessories. This Power Plant operating daily, and in A-1 condition. For price see,
RED BANK COAL COMPANY,
79 Vandergrift Building,
Pittsburgh, Pa.

AIR COMPRESSORS

50 ft., 49-ft. and 69-ft. Steam Drive.
355-ft. Ingersoll-Rand F. R. Steam D.
442-ft. Sullivan, WJ3 Belted.

AGITATORS

1—New 300-bbl. cap. 15 ft. dia. 27 ft. high.
1—Fine 250-bbl. Cap., 12 ft. dia. 26 ft., 6 in. high.
Both lead lined and equipped with ladders, walkways and fittings.

BOILERS

6—Erie 150-Hp. HRT 150 lbs. pressure.
3—Freeman 150-Hp. Scotch Marine 145 lbs. pres.
2—Erie 200-Hp. Scotch Marine 150 lbs. Pres.
3—500 and 2—468-Hp. Sterling water tubes.

CONDENSER BOXES

2—10 ft. wide, 40 ft. long, 8 ft. deep.
3—30 ft. wide, 30 ft. long, 8 ft. deep.
2—10 ft. wide, 40 ft. long, 8 ft. deep.
All equipped with 10-ft. compartments.

HEAT EXCHANGER

1—8 ft. by 30 ft. Heat Exchanger, has 4,000 ft. 4-in. pipe.

OIL ENGINES

3—25-Hp. Fairbanks Morse & Type.
1—50-Hp., 1—75-Hp. and 1—150-Hp. FM Y's.
Can furnish generators to suit.

DUPLEX STEAM PUMPS

6 Gardner 7x5½x6, 4 in. suc. 3 in. dis.
4 Gardner 6x5⅝x6, 4 in. suc. 3 in. dis.
1 Dean 10x7x10, 6 in. suc. 4 in. dis.

STEEL TANKS

6—55,000 bbl. cap., 1—25,000-bbl. cap.,
1—15,000 bbl. cap., 1—4,400-bbl. cap.
30 others from 250 to 4,000-bbl. cap.
10 scrubbers and pressure tanks.

STEEL STILLS

3—11 ft. x 40 ft., 1—14 ft. x 35 ft.
4—10 ft. x 30 ft., 1—8 ft. x 25 ft.
All complete with steel supports.

STEEL TOWERS

25—5 ft. dia. x 25 ft. high.
10—5 ft. dia. x 20 ft. high.
Also steel supports for same.

MISCELLANEOUS

1,000 valves 1 in. to 10 in.
Screwed and flanged type. Many are new.
95 Reid Glass Peep Boxes.
10 Foamite 40-gal. Fire wagons.
6,000—6,500 and 8,000-gal. car tanks.

HYMAN-MICHAELS CO.,
Peoples Gas Bldg., Chicago, Ill.
Railway Exchange Bldg., St. Louis, Mo.

REFINERY EQUIPMENT for sale. The old Beaver Electra Refining plant at Electra is now being dismantled and offered for sale at 25% of what the material cost new. Some of the boilers, stills, vapor towers, condenser boxes and valves are in first class condition and offered at a bargain. Also have three 5,000-bbl. capacity and three 1,000-bbl. storage tanks. Address Edward Schlaffke, Electra, Texas.

TEN 3 COMPARTMENT, 1,000-gallon Government truck tanks with cradles. Good condition. Address, A. & M. Petroleum Co., Box 599, El Paso, Tex.

MANUFACTURING MACHINISTS

CRAGO CUT GEARS

Worthy of your confidence. General machine work. 1416 Walnut, Kansas City, Mo. Phone Harrison 7660.

MACHINE WORK — CASTINGS
Machined to your drawings, Gears, Machinery designed and built.
Modern Facilities—Prompt Service
Reasonable prices. Send for our booklet.
GENERAL ENGINEERING AND MFG. CO., ST. LOUIS, MO.

EQUIPMENT WANTED

WANTED—Rotary rig complete, immediately, will buy or lease; must be in A-1 condition. Give full description and location in first letter. Box 411, Odessa, Texas.

BUSINESS OPPORTUNITY

1/24 INTEREST in 140-acre lease, Greenwood County; 2 producing wells, $1,000 guarantee 20% dividend. A. Miller, Bitting Bldg., Wichita, Kans.

DESIRE CONNECTION with responsible party to furnish capital for oil royalty company. Highest references given and required. P.O. Box 806, Tulsa, Ok.

I AM INTERESTED in acquiring good block of acreage for drilling providing geology is favorable. Anywhere in Mid-Continent area. Submit in detail to J. N. Vanderpoorten, A. O. U. W. Building, Little Rock, Arkansas.

OFFICE SPACE FOR RENT
IN THE PALACE BUILDING

Lowest rent in the downtown district for modern conveniences.

S. JANKOWSKY, OWNER
Box 2073 Tulsa, Okla.

MR. WILDCATTER

Do you need money to finish or go below contract depth? We may be able to assist you, write stating location and depth of well, kind of rig, amount of acreage, condition of hole, contract depth and all other information possible. Send geological map and report if you have one. Box C-33, The Oil and Gas Journal, Tulsa, Okla.

ORGANIZATION

A Declaration of Trust, the modern method. Conforming to all state laws, operates everywhere. Charters, seal, certificates, records, forms $100. Booklets. Delaware Charters if you prefer. Promotion and financing of everything.

HEMENWAY
Oklahoma City, Okla.

THIS WILL save money, time and worry. We have found a method of burning sharp mixtures of gases, whereby large or small volumes may be used automatically in domestic heating units without back flashing. E. C. Merrill, Pittsburgh, Pa.

FINANCE your project with stock bonded. Quickest and most satisfactory known method of raising capital. Information free. Bankers Interstate Security, Electric Bldg., Denver, Colo.

A GREAT BIG corner lot; three houses and filling station; close in; key to big rich part of city; $15,000 cash. MacDonald, 211½ S. Boston, Tulsa, Okla.

EXPERIENCED Oil Operator, owning standard rig and tools, now engaged in drilling wildcat wells in Texas, wishes to form an association with individual or oil company, capable of assisting in the financing of new wells, on large blocks of acreage, and the purchasing of semi-producing properties; man with legal training preferred; references exchanged. Box B-960, The Oil and Gas Journal.

CAPITAL—An experienced dependable broker with following will aid in financing a worth while proposition. B. W. 810 Broad St., Newark, N. J.

35 CENTS a line first insertion; 25c a line each additional insertion. Cash in advance.

CLASSIFIED WANTS

CREATE AND BUILD BUSINESS

MAIL your advertisement now. It will be published next week. Cash with order.

BUSINESS OPPORTUNITY

FOR SALE—Corner 6th and Main St. containing of 3 lots, No. 13, 14, 15 block 12 in the town of Jenks, Okla., suitable for gas filling station inquire next door or write owner. E. Lineck, 830 N. St. Louis Ave., Chicago, Ill.

POSITION WANTED

MARRIED MAN wishes position with progressive company. Have had nine years experience in dressing tools and also 20 years experience in all-around oil field work. Address S. E. McCrory, 122 N. Nogales, Tulsa, Okla. Phone 2-2071.

FIRST-CLASS surveyor wants position. Eleven years experience. Write T. J Collins. 2536 E. 5 h Place, Tulsa, Okla.

CLAIM MAN—Now employed. Thoroughly experienced Oklahoma and Texas law. Can handle any representative proposition. Correspondence invited. Box C-34, The Oil and Gas Journal. Tulsa. Okla.

FIRST-CLASS welder with executive ability, good education, wishes permanent position; age 25, married; best of references. Box C-30, The Oil and Gas Journal. Tulsa. Okla.

PRODUCTION SUPERINTENDENT familiar with cable or rotary tools. Fifteen years' experience. Best references. Not afraid of work. Box C-31, The Oil and Gas Journal. Tulsa. Okla.

AUDITOR—Age 29, married, university graduate, experienced as public and commercial accountant as well as in office management. Also familiar with leases and royalties. Now employed but have good reason for change. Require salary of $300 a month. Good references. Box C-32, The Oil and Gas Journal, Tulsa. Okla.

COMBUSTION ENGINEER desires connection with progressive company; 15 years in the power field, 10 years in refinery work. Available on 30 days' notice. References. Box C-25, The Oil and Gas Journal, Tulsa. Okla.

TECHNICAL graduate, 7 years well drilling experience, wants position in producing or engineering department of producing company. Permanency and future advancement considered more than salary. Will go anywhere in U. S. Age 29, married, best of references. Box C-15, The Oil and Gas Journal, Tulsa, Okla.

POSITION WANTED—Young man, age 29, with 8½ years' experience with oil companies. Land and lease department and field work in charge of drilling wells in Kansas. Box C-13, The Oil and Gas Journal. Tulsa. Okla.

GAS LIFT and gasoline plant engineer supt. with seven years' general oil field experience, desires position anywhere. Salary $300. Box C-12, The Oil and Gas Journal. Tulsa. Okla.

A DESCRIPTION of your used equipment run in these columns will sell it for you at a nice profit.

GEOLOGIST

H. L. BALDWIN
Petroleum Geologist
Telephone 74
Fort Stockton, Tex.

WANTED

WEST TEXAS OIL LEASES
$1 per Acre Up

In Brewster, Hudspeth, Pecos et al Counties on the Trans-Pecos Fault. Ask for maps, information, prices.
L. R. BARTON & Co.
4016 Camp Bowie Blvd., Ft. Worth, Tex

WANTED—WET GAS CONTRACTS
We want wet natural gas for casinghead plant. Will start erection immediately. Give volume, gasoline content. Contract Dept., Wm. H. Allen, 1215 Detwiler Bldg., Los Angeles, Calif.

HELP WANTED

SALESMAN

We require a high-grade man with experience selling power-plant specialties. Acquaintance with executives or buyers in industrial field in this territory is necessary. Every industrial and public institution, hotel, office building are prospects. The entire line are proven producers and backed by a Surety Bond, guaranteeing complete satisfaction on each sale. A man with the ability and initiative to sell can secure a permanent, profitable position with 100% co-operation from this company. Thorough training given; exclusive territory. Give complete details; replies confidential.

THE NORTH AMERICAN FIBRE PRODUCTS COMPANY

Cleveland, Ohio

$3,000 TO $25,000. Men find our Service effective in making connections. Individual. Confidential. Not agency. Jacob Penn, Inc., 9 Park Place, New York.

WANTED — Blacksmith, tooldresser. Must know how to dress and temper fishtail bits for rotary, waves $7 per day to start, steady work. Address Ed. Phillips, Morland, Kans.

LEASES—PRODUCTION

LEA COUNTY, NEW MEXICO
LEASES
State lands well located. Write for description and price.
LOS ANGELES-NEW MEXICO OIL CO.
114 S. Los Angeles St., Los Angeles, Cal.

FOR SALE—4,000 acres of leases. 10-year 88 revised form. Near major company's drilling wells. Contracted for deep tests. Write for prices, location. Box 401, Clovis, New Mexico.

HAVE CONTROL several thousand acres in McKinley County, N. M. Part in Twp. 19N Range 7W. Can get one block of 7,500 acres. Johnson & Lodewick, Box 407. Roswell, N. M.

FOR SALE—5 acres of land in fee. Prospects good for a big gas well; land joins Corporation of Shreveport, La. Best offer takes it. Otto Larsen, owner, P. O. Box 200, Amarillo. Tex.

FOR SALE—Leases, Oil Production, Asphalt, Lime Stone and Other Mineral Lands. W. P. Harley, Bowling Green, Ky.

BARGAINS IN oil leases and royalties in Pecos-Brewster Counties. Co-operation. Particulars. Box 620, Fort Stockton, Texas.

WEST OF THE PECOS
On to Brewster
Squarely in the trend.
Mid-Kansas Oil & Gas Co.
Spud in September 7, 1927.
Write for maps, photographs.
40 acres up to 100,000.
R. E. Plumbe, 646 First Natl. Bank Bldg.
El Paso, Tex.

DRILLING BLOCK secured on approved acreage and well supervised; no bonus; we keep some acreage as fee. Nicolle, Petroleum Geologists and Operators, Box 1720, Fort Worth, Tex.

PECOS COUNTY river sections, owners leases, 5-acre blocks, $50; rental, $1; royalties, 1/64,; 20-acre blocks, $25; choice of Sections 20, 28, 29, 30, 33, 35, 37, 41 and 49, Block 9; Sections 1, 3, 4, 5, and 7, Block 11, H. & G. N., CLCo., Box 547, Sioux City, Iowa.

NEW MEXICO oil leases; Lea, Eddy, Chaves, Union, Quay and all other active counties; complete list and map on request. Orcutt-Harris & Co., Colcord Bldg., Oklahoma City, Okla.

SOUTHWEST TEXAS — WINKLER, Loving, Reeves, Ward, Pecos, Culbertson Counties.
Drilling blocks. Leases. Royalties.
Ranches in fee.
H. F. Anthony, Pecos, Tex.

LEASES—PRODUCTION

WINKLER—PECOS COUNTIES
Leases and Royalties
W. S. PATTERSON
Pecos, Texas

OIL LEASES and royalties, Ector, Crane, Pecos, Reeves, Ward, Upton and Winkler Counties; buy or sell. C. H. C. Anderson, 712 Linz Bldg., Dallas, Tex.

20-ACRE oil and gas lease, Section 7, Block 26, Winkler County, Texas. Make me an offer.
5941 North Washtenaw Ave.,
Chicago, Ill.

LOCATED in the center of the big oil development work of Jones County, Texas. Only 5 miles from where one-half of the royalty sold for more than we are asking, we offer for sale 140 acres in fee. Land well worth price asked as it is all incultivation and fair improvements. Land first-class agricultural land with 100 acres with all mineral rights only $100 per acre. Mrs. E. U. Morgan, 422 Staley Bldg., Wichita Falls, Tex.

FOR SALE—New Mexico oil leases, on good structures in eastern counties where drilling is active, 25 and 50 cents per acre with 5 cents rental per acre per year. Address Box 1266, El Dorado, Ark.

FOR SALE—Shallow field of Nowata County, Oklahoma, 1,810 acres, with 212 oil wells, 19 powers, close to air, blocks to suit purchasers; many locations to drill; also 980 acres on drilling contract, some have offsets. Write Box 11, or Phone 767, Nowata, Okla.

OIL AND GAS LEASES—1,000 to 10,000-acre blocks, Smith, Van Zandt, Henderson, Gregg, Harrison Counties, Texas. P. H. Torrans, Tyler, Tex.

$3.50 PER ACRE buys 80 acres of land in McCurtain County, Oklahoma. P. T. Calahan, Idabel, Okla.

"IN THE TREND"
Southeastern New Mexico and West Texas counties — Lea, Eddy, Chaves, Gaines, Andrews, Winkler, Loving, Ward, Culberson and Pecos Counties, oil and gas leases, royalties and drilling blocks. We buy and sell. F. S. Blackmar, P. O. Box 541, Roswell, N. Mex.

NEW MEXICO LEASES
Leases bought and sold any part of state. Inquiries replied to promptly; maps. William U. Tate, Francisan Hotel. Albuquerque, N. Mex.

$1,200 CASH gets the SE¼ of Sec. 25-20-10 Osage County. Gas well offsets North and Barnesville pool in adjoining quarter section. A. G. McDonald, Sand Springs, Okla.

NEW MEXICO

Genuine opportunity to secure 2,560 acres for a well in the San Juan high gravity field close to production. Fuel and water on the ground. Price $2.50 per acre. Address P. O. Box 1195, Sapulpa, Okla.

FOR LEASE—25,000 acres in block G-14 and G-15, Brewster County, Texas, $2 per acre for all or part. E. K. D., Box 1099, Wichita, Kans.

WANTED TO BUY—Production in Mid-Continent area, either in small tracts or in one location, up to 3,000 bbls. settled daily production, if priced right. Address 706-7 A. O. U. W. Building, Little Rock, Arkansas.

WANTED OIL LEASES AND ROYALTY
New company just organized; plenty of capital, desires to buy leases, royalties, production, drilling contracts, or will drill proven or semi-proven acreage on percentage basis. State fully what you have in first letter. Address Box C-14, The Oil & Gas Journal, Tulsa, Okla.

INCORPORATIONS

CHARTERS—Delaware best, quickest, cheapest, most liberal. Free forms. Colonial Charter Co., Wilmington, Del.

DELAWARE incorporators. Charters fees small, forms. Charles G Guyer, 901 Market St., Wilmington, Del.

ROYALTIES—PRODUCTION

NOTICE
Offering undeveloped and producing royalties, leases and drilling blocks, Brown (Fry Field area), Coleman, Callahan and Shackelford Counties, Texas.
All offerings submitted will be accompanied by geological information.
M. ELDER & COMPANY
Coleman Hotel Bldg., Coleman, Tex.

BETWWEN WINKLER AND ECTOR County Pools. Right in the play; 120 acres of 1/16 oil and gas royalty at $7 50 per acre. $15 base. 1/32 at $4 per acre. 1/2 POTASH royalty at $5 per acre. Four miles from U. S. Government POTASH test, 6 miles from Cosden-Texas Co. wells. 1 mile of Texas lease Block. ANDERSON, 710 Linz Bldg., Dallas, Tex.

ROYALTY—Texas Panhandle, Donley Co. Next probable extension of Panhandle area. Price ahead of production. A. W. Gerner, 804 N. Fillmore, Amarillo, Tex.

ROYALTIES—Let us represent you in the purchase and sale of royalties. A. O. Self Investment Co., 1019 Fidelity Union Bldg., Dallas, Tex.

ROYALTIES IN SEMINOLE FIELD
Will buy or sell. Write, H. F. Potts, Seminole, Okla.

SACRIFICE PRICE
Last opportunity to buy one-fourth oil royalties and 10 year leases combined, in good prospective Oklahoma fields for $2 per acre. Abstracts furnished.
Room 408, Bliss Bldg.,
Tulsa, Okla.

ROYALTIES—40 acres. "In the Trend". Winkler County Texas. Harry Haynes, Grantville, Kansas.

FOR SALE—Royalty paying 25 per cent. P. O. Box 3263, Tulsa, Okla.

J. F. MARION OIL COMPANY
Magnolia Building
Dallas, Texas
Buys and sells Texas Oil Leases and Royalties

MONEY RAISING

RAISE CAPITAL!
Through sale of securities in your corporation. Worthy enterprises only. Twenty-five years experience. Highest references.
NORTHCLIFFE,
25 West Forty-third, New York.

DO YOU NEED MONEY for organizing or financing oil or mining deals? Write 131 E. 13th, Oklahoma City, Okla.

OIL INDUSTRY PRINTING

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

CONSUMERS' LEDGERS
We are prepared to furnish from stock standard forms of gas meter Consumers' Ledgers. Sample forms and quotations on request. First-class material and workmanship.
DERRICK PUBLISHING CO.
Oil City, Pa.

PATENT ATTORNEYS

REGISTERED PATENT ATTORNEYS
United States and Canada
Before disclosing your invention to anyone, send for blank form.
Evidence of Conception
Bulletin "How to Establish Your Rights" and complete information free.
LANCASTER & ALLWINE
240 Ouray Bldg., Washington, D. C.

PUBLICATIONS

NO CHARGE

One month's subscription to Pecos County's pioneer newspaper. Reliable information from county seat. Free.

A. L. HILLER
Fort Stockton, Tex.

ADDITIONAL CLASSIFIED WANTS ON PAGE 344

Chicago Market Tone Reported Better

Buying Still for Present Wants Only, But Consumption Continues Large and Station Stocks Are Light

By J. B. Waldo

CHICAGO, Sept. 19.—There was not a large amount of gasoline business in the spot market Monday, but the tone was better. Some refiners who had been selling at one-eighth advanced to 6¼, and one refiner made his price 6⅜. This particular concern has been buying gasoline for its own business as the demands from its stations have been all that it could supply and it had its jobbing customers to care for. Buying is still for present wants only but as the consumption has been large and station stocks light many small orders for immediate shipment have been received. The change which came on Sunday in this vicinity from undue heat to a temperature below normal for the season will reduce the consumption as it makes night driving for pleasure less important. The weather is very pleasant and a continued good movement, if not as large as during the first half of the month is expected. The many thousands who will come to this city for the sparring match on Thursday night will swell the local and near-by consumption. A feature of the demand right now is the buying from refiners by refiners for their own needs.

Kerosene continues to be strongly held and a price of 4⅜ cents to the trade was made by several refiners for the 41-43 gravity on Monday.

Weather Helps Distillates

The cooler weather is expected to improve the demand for distillates and zero gas oils but at present the demand is still quiet. There was only a rather routine business in fuel oils with 24-26 and lower freely offered at slightly lower prices. There is a good deal of price cutting in part of Indiana and Illinois right now and some refiners who are meeting local competition are eliminating all discounts. In Indianapolis where the prices have been reduced by most of the sellers 4 cents below normal the Sinclair Refining Co. states that it has met the price but is not allowing either the bulk or Q. D. A. discounts, while others are asking the same price at the station and tank wagon and allowing 1 cent to resellers.

Last week in this city was reported by the weather man as the hottest September in 51 years. The bulk of the increased business due to the recent hot spell, went to the refiners direct against the contracts. Some business was placed here where immediate delivery was necessary which the regular source of supply could not give. The bulk of the business placed here last week in gasoline was wanted immediately. Some of the sellers, both refiners and marketers, make it a part of their plan during the period of largest demand to keep a certain number of cars on the road for the purpose of diversion to just such buyers, but last week it was hard to find any of these cars unbooked.

Range of Prices

The demand was very largely for the U. S. Motor grade with a fair sprinkling of orders for the 60-62 gravity with either a 437 or a 400 endpoint and for the 64-66 with either a 390 or a 375 endpoint, but there was no difficulty in filling any orders for these grades, and prices, as well as those for the U. S. Motor grade, were little changed. Sales were made within a range of 6 to 6¼ cents for the U. S. Motor grade and it was not very difficult to secure the higher price if the delivery was prompt. Some of the sales offices held strictly to the 6¼-cent price all through the week, but there was a considerable percentage of the business done that went at 6⅛ cents and some at 6 cents, although most of the lowest-priced gasoline went to special localities and that early in the week. An Ohio distributor might be able to buy U. S. Motor gasoline out of Toledo, for example, at a price that figured delivered the equivalent of 6 or even 5¾ cents Group 3, but he paid the refiner the difference in the freight costs of delivering that gasoline between the cost delivered from Group 3 and from the local plant and the refiner received a good return for his gasoline.

Caught by Hot Spell

One feature of the situation was the purchasing by certain refiners for their own distribution. Evidently they had not planned any more than the independent distributor on carrying large supplies of gasoline at their stations and they were caught in some cases so badly that they had to buy where they could get the gas. The heated term was so very unexpected, coming as it did after a couple of months when the temperature was below normal, that the trade was all caught more or less. Some refiners with gasoline in storage found that they could not get their cars back fast enough to make prompt shipments on all the gasoline that was ordered out from their plants by their station agents and their contract customers.

The demand for the special motor fuels intended to overcome the knock in the engines is good. These grades are, to a considerable extent, taking the place of the higher gravities. The largest seller seems to be the ethyl gasoline. Some station managers and heads of distributing companies state that their sales of ethyl gasoline at a station which does not have a large trade with trucks will run from 30 to 40 per cent of the gasoline sold by them at such stations. Some of the oil men, even those with antiknock brands of their own, use occasional fills of the ethyl gasoline, claiming that it frees their engine from carbon deposits and that they improve the operation of their engine by using ethyl occasionally, say a couple of fills of ethyl and then using the regular grade for several weeks. The demand for natural gasoline has been less active and prices are lower in this market.

Kerosene Demand

Kerosene has been in steady demand and the market is very firm with many asking 4¼ for the 41-43 gravity, although sales are made at 4⅛ cents. The lowest prices at which a reliable kerosene can be had from refiners for resale is now 4 cents, which is an advance of one-quarter of a cent from the low price of the market. A steady trade in this product is looked for. Several refiners state that they are sold up for immediate shipments on this gravity. The 42-44 gravity is only occasionally called for and is not freely offered, in fact, is in rather limited supply, as the number of refiners that run it are few at present. It can be had at 4½ cents, although some are asking 4¾ cents and claim that they have been able to sell at that price.

Distillates Drag

Distillates continue to drag. The warm spell seems to have made business in this line very quiet. Distributors report that they are finding few of their customers who are willing now to fill their tanks and this prevents them from making room for further deliveries from the refiners. The spot business has been very light and prices have only held their own. There seems to be no great quantity of distillate likely to be called for in the immediate future unless we have a very early fall. Nearly every distributor has some stock, usually not a large one, but enough to begin the season on, and nearly every dealer has a contract with some source of supply. Many of these contracts are for their requirements at the market price, some with a minimum and a maximum price. In fact, most of them have at least a maximum price agreement. There are some of the larger distributors, such as some of the large concerns in this city, who move as high as six cars of fuel oil of all grades daily, who would still buy if they could get the price. One of the representatives was seeking for furnace oil last week, but his ideas as to price were at the lowest refinery price today for a considerable quantity over the winter. The refiner, on the other hand, who has any really desirable furnace fuel knows that the demand is bound to come and they believe that they can get a better price a little later. The peak of the demand on the refinery may be delayed, both by the stocks that have been carried over or quietly bought by distributors and also by a warm fall.

Gas Oil Market

The gas oil market, so far as the industries are concerned, has been featureless. A good straightrun gas oil is being sold right along at 2½ cents to gas companies and to industrial users. There has been no great movement, just about a steady seasonable demand. For the zero oils there is a steady inquiry and more or less business is being booked. The actual sales are held down by the opposite views of buyer and seller as to price and by the fact that supplies of clean zero oils with a low flash are scarce. There has been some movement of these oils, even at the usual price today, which is 2¾ to 3 cents, and in some cases a little higher price has been paid for spot deliveries, while the market over the season is considerably higher. This is a good deal a matter of judgment. One sale was made of cars over the winter at 3½ cents and both parties are satisfied with the price, but the specifications of the oil are just about ideal for furnace oil. The reports made by some of the larger and more active manufacturers of domestic oil burners indicate that the number of installations this season will be considerably larger than they were a year ago.

Fuel Oil

Fuel oils continue to move steadily in rather small quantities to the consumers. In a general way the higher gravities which have a low cold test are firm and the lower gravities easier in tone and a little lower in price. There is an abundance of the heavy oils and some of the larger refiners with extensive cracking plants have quantities of fuel oil ranging from around a 14 gravity down as low as 6 or 8 gravity. This oil is not so readily usable, but some of the large consumers find that it pays them to equip themselves to burn this heavy fuel oil. Some will burn it in the summer but use a lighter product in the cold weather. Stocks of fuel oil, as a whole, seem to be large, but there is no great abundance of the lighter gravities, especially those with a low cold test. There has been no change in the tactics of the buyers and they are working in every way to reduce their fuel costs. Many of them are buying on the month-to-month plan and only occasional orders are being placed over a period by the industrial users. Some of the distributors have bought more largely, but, on the whole, the tendency is to buy for the present wants and await developments. There is very little Smackover oil coming to this market. The price, as compared with refinery fuel oil, is prohibitive. Scattering cars are sold at around $1.15. Some of this crude is being used in the manufacture of lubricating oils.

Lubricants

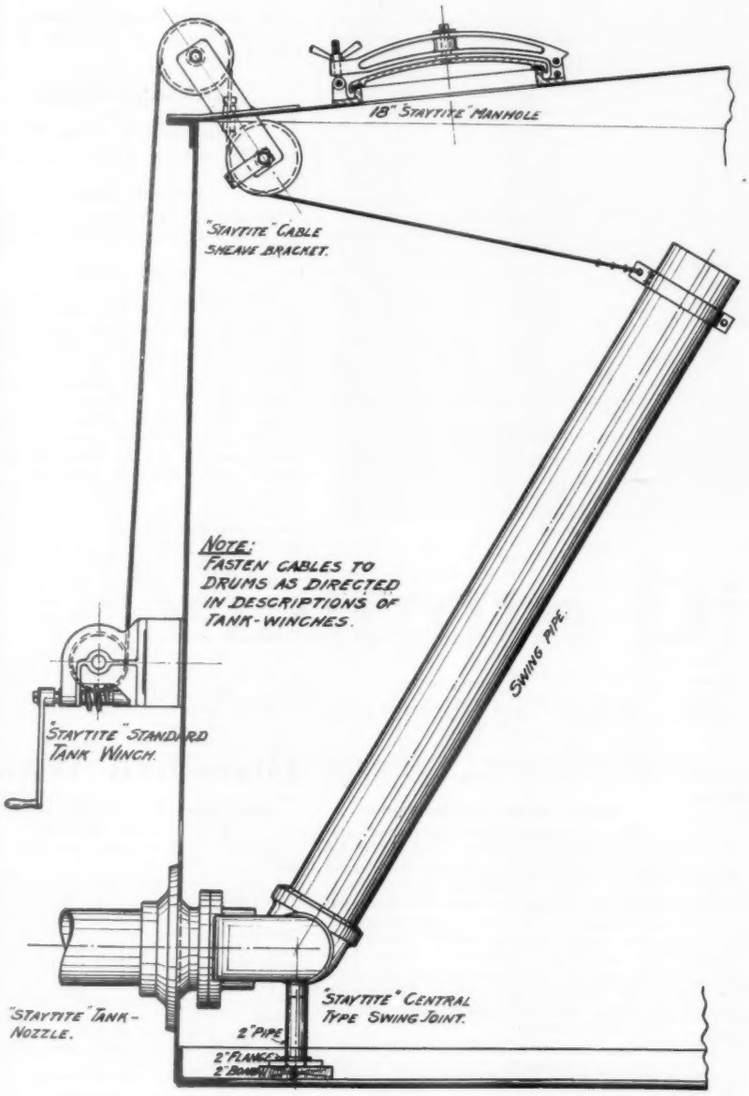
Lubricating oils are moving along with little change. There is again much complaint of cutting of prices on motor oils and of the tactics used by sellers to secure orders, and the large and small refiners and compounders are equally criticised. With many distributors lubricating oil is being used as a sort of bait to secure gasoline business. Punch cards are issued which record the quantity of gasoline bought and when 100 gallons is totaled by one customer he is given a can of lubricating oil. Generally the business is running along in a rather routine fashion. The demand for motor oils has been somewhat improved by the recent increased use of the auto during the hot spell. Refineries report that their business in car lots is good with compounders and that they have made no changes in price.

Business Large

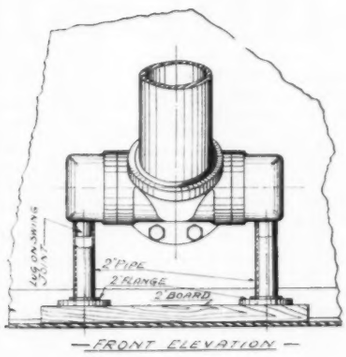
The great increase in the demand for gasoline at the stations has, for the time at least, caused the dealers to do less thinking regarding the possibility of a tank wagon decline. There have been no reports of such a decline in the immediate future for a week. Even the Q. D. A. adjustment has been neglected as a matter for speculation and rumor. The business has been so large that the dealers have even forgotten to lament the little profit in it. The chief expression of regret is that the heated term did not come during August when it would have been seasonable and helped the business much more than it will now. Still it has used up a lot of gasoline that would otherwise have been a depressing influence on the market. There has been a good deal of trouble at many stations regarding the securing of gasoline as needed. Many of the refiners are behind with shipments and the dealers want the gasoline now if they are to have it at all. In spite of the good business done, there have been a number of points where the price has been cut drastically. For example, at Decatur, Ill., where the normal station price is 18.2 cents, a cut was made to 15 cents. Finding it impossible to secure a return of the price to normal, the Standard reduced its tank wagon to 8.5 cents and its station price to 10.5 cents, including the tax. With gasoline costing 6¼ cents in the field and a 2¼-cent freight rate, the 8½-cent price represents the cost of gasoline delivered at Decatur, or very nearly so. Over the border in Indiana there are several important points where gasoline prices have been radically cut. In some of the localities the market has been returned to normal, one such case being at Springfield, Ill., but the situation over the territory shows little change. No general decline is at all likely while the consumption remains at its present high level, for that would be too much to expect but at a seasonable quantity. The month of October last year was a bad one for gasoline consumption, but that month is frequently a good month for gasoline sales, not up to August, but frequently as good or better than June, and it might be well to have the thought in mind that this year may prove one of the years when October is a splendid month for driving and not let the gasoline supply run out altogether.

STAY TITE

See us at Booth 65 Oklahoma Building



The only central type swing joint for tanks on the market. Eliminates tipping and turning, pulling apart and leaking.

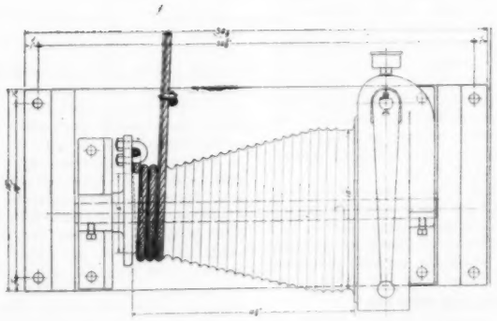


THE STAYTITE CO.

3606-12 Polk Ave.
HOUSTON, TEXAS

Constant Pull Winch

Drum is tapered and a screw-like groove provided for the cable to run in, so that an automatic speed change is provided, which causes the load on the winch handle to remain nearly constant, but saving considerable time in lifting the swing line.



EASTERN PRICES ARE UNCHANGED, BUT TENDENCY REPORTED DOWNWARD

By N. O. Fanning

New York Bureau, The Oil and Gas Journal, Room 629, No. 101 Park Avenue, New York, N. Y.

NEW YORK, Sept. 17.—Weather conditions along the Atlantic Seaboard during the first two weeks of September have been much better from a gasoline-consuming viewpoint than during the month of August. Allowing for a decline in touring activity the use of motor fuel should still make an exceptionally good showing. This factor is stressed because much has been made of the theory that with summer over, the consumption of gasoline was bound to fall sharply, with a consequent further depressing effect on gasoline prices. Any fur her cuts in this territory are being far from taken for granted by the trade here. Much hope for improvement is placed on the possibility of unusually good motoring weather to make up for the cold and rainy summer.

Of course fundamental condi ions in the refined oil markets in the East are still bad. You cannot raise prices in the face of drastic competition and overproduction of the basic commodity, crude. The fact that there are far too many retail outlets has been duly stressed here and elsewhere, and does not bear repetition. From the other end of the line, there is every indication that refine.s are well stocked and are able to get all the cheap crude they want. Instead of a dearth of crude, there seems to be more than ever available. This is indicated by the greatly increased movement of oil to the Atlantic Seaboard from California and Venezuela. With pipe line capacity in Colombia doubled and a greater supply of crude from capped wells awaiting an outlet, imports from that country may also be increased in the near future. The outlook for Atlantic Seaboard prices therefore is not regarded as particularly encouraging. Still, every straw, such as increased consumption, is grasped with eagerness as hastening the time when improvement can be expected.

The price situation generally in the East is unchanged. Much attention is being paid the agitation over gasoline prices in Virginia, where the governor has been conducting an inquiry, claiming prices are too high. The fact is several Atlantic states have prices higher than Virginia, because they are farther removed from production. The upshot of the Virginia warfare, however, may be a broader inquiry and at least the oil industry may face another of the long string of Federal investigations into gasoline prices. The Virginia situation is looked upon as merely one more unfavorable indication in the oil business.

Atlantic Coast oil refiners are still selling U. S. Motor gasoline, and lots of it, at 8¼ cents a gallon. Some small sales are reported as low as 8 cents.

The tank wagon markets are unchanged, but the tendency is inexorably downward as a reflection of cutting of retail prices at numerous service stations.

Kerosene Steady

Kerosene is more steady. Most refiners are still selling water white for 6½ cents in tank car lots, but at least one was reported to have raised the offering price to 6⅝ cents. Refiners are understood to be bettering their position in this product as a result of better export sales and an improved demand for furnace oil at home.

It appears the sale of large quantities of Russian kerosene to Standard of New York and Vacuum Oil has relieved the European kerosene market and has actually resulted in increased sales of American kerosene in Europe.

On the other hand, eastern jobbers handling Mid-Continent and California kerosene are becoming more active and are making liberal offerings at existing prices. Their outlet is entirely domestic and the effect is to keep the price down.

Gas and Fuel Oil

Many close students of the gas oil and fuel oil markets are still looking for lower prices. There really has been no drastic change in conditions and perhaps some are overlooking the fact that consumption should show a seasonal increase from now on. The unfavorable prognostications have been due more to the release of formerly shut-in California heavy oil, large imports of South American oil and the fact that several sales have been recorded below existing market prices, indicating the existence of a certain amount of distress material. Added to this is the lower prevailing ocean freight rates. It is pointed out that ocean transportation now plays a big part in the fuel oil market. The Atlantic Seaboard refiners, who handle a very large fuel oil business, obtain most of the fuel oil and the crude from which they get fuel oil, by tank steamer.

Prices for both gas oil and fuel oil have not changed on the Atlantic Coast despite all these unfavorable indications. Practically no fuel oil is sold in bulk. The price for bunker fuel oil to the trade at New York harbor is $1.65, with lighterage 6½ cents extra. Diesel oil is $2.10. Gas oil is sold in tank car lots at 5½ cents a gallon.

Lubricating Oils

The eastern lubricating oil market is somewhat mixed. The demand for motor oils is the brightest feature. Cylinder stocks are lagging. The sale of lubs to industrial consumers and the railroads has been falling off and the expected autumn improvement has so far failed to materialize.

Paraffin Wax

Paraffin wax market is improving. Prices are unchanged but 135-37 is apparently become more scarce, and 130-32 is also offered less freely at existing levels.

Petrolatum

Sales of petrolatum are brisk. One sale of dark green at 2 cents a pound was reported, but most factors are claiming 1⅞ more representative quotation based on the majority of sales.

Export Market

The oil export market is still generally in an unfavorable condition. Weakness is especially noteworthy in gasoline, and fuel oils.

English Prices Down

Taking effect from September 1, prices for both furnace and Diesel fuel oil were reduced by 5s per ton, both for inland consumption and bunkers. Prices are now: Furnace fuel oil, £3 15s per ton in bulk, ex-ocean installation, for inland consumption, for bunkers the price is the same, viz. £3 15s per ton. Diesel fuel oil, £4 10s per ton, in bulk, ex-ocean installation, for inland consumption, for bunkers the price is the same, viz. £4, 10s per ton.

"Motor Spirit—The following are the wholesale delivered prices in cans:

	Aviation	No. 1	No. 3
Inner London zone	1s 4d	1s 0d	0s 10d
Outer London zone	1s 5d	1s 1d	0s 11d
Rest of England and Wales	1s 6d	1s 2d	1s 0d
Scotland South	1s 7d	1s 3d	1s 0d
Scotland North	1s 7d	1s 3d	1s 1d
Belfast zone	1s 7d	1s 3d	1s 1d
Rest of northern Ireland	1s 8d	1s 4d	1s 2d
Dublin zone	1s 6½d	1s 2½d	1s 0½d
Rest of Irish Free State	1s 7½d	1s 3½d	1s 1½d

Bulk prices 2½d per gallon less in all areas except inner London zone, where they are 1½d, and Irish Free State where they are 2d per gallon less. Lubricating Oils—The market quotations are as follows: American pales £10 10s to £20 7s 6d, American red £12 10s to £17 10s, American dark cylinder £11 15s to £29 10s, and American filtered cylinders £19 7s 6d to £33 per ton, less 2½ per cent, barrels free, ex wharf. Gas Oil—In rail tank cars, i.e., 10-ton lots, 5d, and in smaller quantities of 1,000 gallons and upward 5¼d per gallon. net and naked, ex wharf. Kerosene—Unchanged. Water white 10d per gallon, and Standard white 9d per gallon, in bulk, for London and the home counties. For the rest of England and Wales the prices are 1d per gallon dearer, for Scotland 2d, and for Ireland 3d per gallon dearer. Barreled oil ex wharf 3d per gallon above bulk prices for both qualities. Paraffin Wax—Prices are from 2½d to 4¼d per pound, ex wharf, ranging according to melting point."

Soviet Oil Difficulties

The Soviet oil trusts, Azneft and Grozneft, have issued a memorandum complaining of the crippling influence of the exorbitant demands made by the Commissariat of Finance.

It is pointed out that the Azneft surrenders to the state 46 and the Grozneft 45 per cent of their receipts in taxes and other imposts, and that, as a result, the trusts are placed in a truly serious financial position. Indeed, in 1928, unless the rates are reduced, receipts will not be sufficient to satisfy even the state demands, which have become all the more onerous owing to the fall of approximately 40 per cent in the prices of motor spirit in the world's market. The reconstruction of the naphtha works at Baku and the completion of the Grozny-Tuapse pipe line were out of the question. Nevertheless, the Commissariat of Finance foreshadowed its intention to increase the amount of the state exactions in the coming budget year.

The trusts declare "that the oil industry, with the present exactions, is unable to make both ends meet. It is now quite clear that the possibilities were overestimated."

Principal Exports

The following table shows principal exports of petroleum and petroleum products from New York during the past three weeks (all figures in gallons unless otherwise noted):

Gasoline:	Sept. 14	Sept. 7	Aug. 31
Bulk	5,205,127	.....	.....
Cases	100,000	1,447,410	590,000
Kerosene:			
Bulk	1,094,195	4,057,200	235,249
Cases	940,000	776,470	2,525,980
Lubricating oil:			
Bulk	2,049,600	1,545,600	1,474,441
Barrels	882,700	1,071,950	802,350
Cases	50,010	157,600	263,680
Lubricating grease:			
Barrels (lbs.)	106,650	733,050	.....
Paraffin wax:			
Bags (lbs.)	1,789,480	1,054,680	1,223,640
Barrels (lbs.)	199,500	1,547,550	966,525
Petroleum asphalt:			
Barrels (tons)	663	.....	.....

The foregoing figures include all shipments of 500 bbls., 1,000 cases, or more.

Tanker Market and Movement

The oil tanker charter ng market was inactive during the week, with a few fixtures reported being at new low rates. Factors report a shifting of interest to the South American trade, where several oil companies are demanding tonnage to move crude. Several vessels recently in the American intercoastal trade have been shifted to th s route and are operating between Colombian, Venezuelan, Trinidad, and Gulf and Atlantic ports of the United States.

New fixtures include the following:

Tanker Freeport Sulphur No. 6, fuel oil, Tampico to Baltimore, September loading, at 25 cents a barrel.

Tanker Palatka, 2,500 tons, asphalt, $4.15 per ton, September loading, Baltimore to Hamburg.

Tanker Rapal o, 10,000 tons fuel oil, Constanza to Ceute, 14 shill.ngs 6 pence, September loading.

The movement of oil to Atlantic ports during the week was rather small, but not indicating any permanent decline. Total arrivals of crude and refined for the week ended September 14 are estimated at 3 355,000 bbls., a daily average of 479,000. Imports were the feature, continuing to ma ntain a heavy pace. Imports from South America exceeded those from Mexico for the third successive week. The South American contribution averaged 81 000 bbls. daily, while Mexico sent 66,000 bbls. a day. Receipts from California totaled 591,000 bbls., a dai y average of 84,000.

The following table shows estimated da ly average receipts of crude and refined oil by water at Atlantic Coast ports for the last three weeks; also monthly record for the last 12 months (figures in barrels):

	Week ended—		
	Sept.14	Sept.7	Aug.31
Gulf Coast	248,000	428,000	398,000
Pacific Coast	84,000	123,000	99,000
Mexico	66,000	46,000	70,000
South America	81,000	55,000	77,000
Total	479,000	652,000	634,000

Daily Averages by Months

1927—	Gulf	Pacific Mexico	S.A.	Total
Aug.	397,000	90,000	80 000	78,000	645,000
July	406,000	83,000	78.000	49,000	616,000
June	378,000	118,000	68,000	47,000	611,000
May	332,000	58.000	91,000	53,000	534,000
April	388,000	93,000	69,000	61,000	611,000
March	345,000	103,000	36,000	81,000	565,000
Feb.	379,000	89,000	40,000	48,000	556,000
Jan.	362,000	73,000	49,000	61,000	545,000
1926—					
Dec.	363,000	57,000	49,000	61,000	530,000
Nov.	335,000	62,000	56,000	40,000	493,000
Oct.	270,000	71,000	61,000	43,000	445,000
Sept.	299,000	98,000	63,000	58,000	518,000

The foregoing figures are based on the carrying capacity of incoming oil-laden tankers.

KANSAS FIELDS

(Continued from Page 66)

cor. NW, Section 4-26-4w, is dry and abandoned at 4,348 feet.

Sedgwick County

Marland Oil Co.'s No. 1 Schmidt, SW cor. NW SW, Section 5-28-1w, is dry at 3,910 feet.

Sumner County

Noble and others' No. 1 Oxford townsite, Lot 15, Block 33, Section 11-32-2, is making 300 bbls. from sand 2,104-53 feet. Ramsey and others' No. 1 Oxford townsite, Lot 7, Block 87, Section 14-32-2, was completed for 400 bbls. in sand 2 018-2,116 feet. Roxana Petroleum Corp.'s No. 1 Fritz, Block 87, Section 14-32-2, made 300 bbls. from sand 2 020-2,116 feet. No. 1 Fritz, Block 88, Section 14-32-2, made 200 bbls. from sand 2,012-2,112 feet. No. 1 Nevitt, Tract 3, Section 14-32-2, Oxford townsite, was completed for 200 bbls. in sand 1,992-2,089 feet. No. 1 Buffington, Oxford townsite, Section 14-32-2, made 400 bbls. from sand 2,005-2,103 feet. Moore and others' No. 1 Oxford townsite, Lot 7, Block 72, is dry and abandoned at 2,225 feet. Indian Territory Illuminating Oil Co.'s No. 2 Norris, SE cor. SW NE, Section 17-32-2, made 12 bbls. from sand 3,693-3,711 feet. Homa-Wood Oil Co.'s No. 1 Fulcher, SE cor. NE, Section 15-34-1, is dry at 4,185 feet.

Classified Wants

RANCHES AND FARM LANDS

TEXAS-NEW MEXICO

Ranches and business property. If I don't have what you want I will find it for you. Chas. Stallings, Clyde, Tex.

SHACKLEFORD CO., TEXAS ranch for sale; 3 sec. on paved highway. Good geology and production in every direction. Not leased for oi.. Must raise some cash. Owner, Box 507, Albany, Texas.

FOR SALE OR TRADE by owner, 735-acre dairy farm and cattle. Six miles north of stockyards. Not an ordinary farm, but a live, pay ng business. C. M. Oliver, 1305 Main St., Fort Worth, Tex.

RANCHES FOR SALE

We have had 40 years active experience in selling ranches. We know the ranches, know the owners of most of them, know relative values in different localities. If in the market for a ranch write us; it will, at least give you the benefit of contrasting what we offer with other propositions.

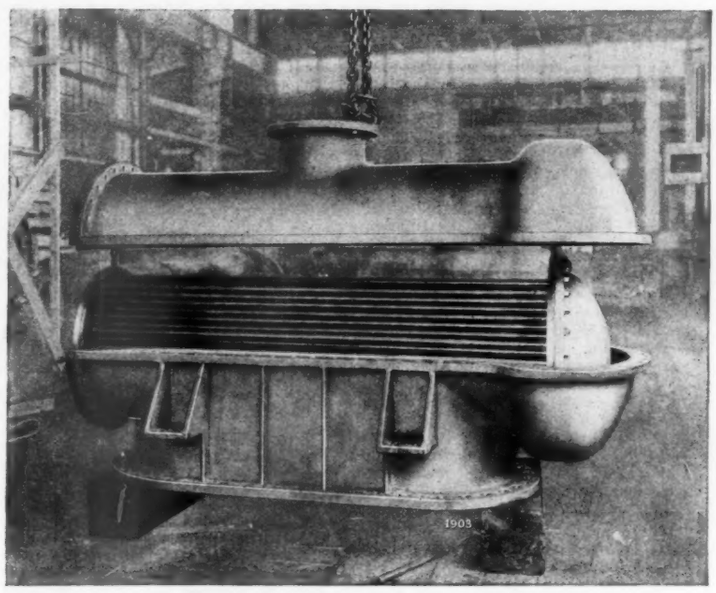
Just now we are stressing a wonderfully fine ranch of 126,000 acres, well improved, abundantly watered, splendidly grassed fronting on a railroad. It is a going concern, stocked with high-bred cattle. This ranch is offered for $6 per acre on easy terms. All mineral rights go with it. Write for particulars as to this, or write us what will interest you. Address

J. N. WINTERS REALTY CO.
422-4 Worth Bldg., Ft. Worth, Texas

OKLAHOMA farming land bargains, 40 to 1,000-acre tracts in coal, oil, gas belt; $5 to $25 acre, come investigate. John Cavanagh, McAlister, Okla.

PROSPECTIVE OIL AND GAS LAND

12,000-acre ranch in corner Atascosa, McMullen and Live Oak Counties, Texas, only $16 per acre for quick sale. James-Dickinson Co., Realtors, Brownsville, Tex.



Vacuum Distillation

Extends the range of oils
Adaptable for lubricating stock

THE temperature of distillation is reduced with the pressure on the oil so that heavy oils may be purified by distillation without altering the composition by overheating.

Wheeler apparatus for high vacuum distillation consists of steam jet vacuum pumps and thermo-compressors for any commercial vacuum (29½ in. or over), vapor condensers, and vapor heat exchangers.

Foster Wheeler Corp.

Successors to Power Specialty Co. and Wheeler Condenser & Engineering Co.

165 Broadway, New York, N. Y.

Works: Carteret, N. J. Dansville, N. Y. Newburgh, N. Y.
St. Catharines, Ont., Canada Egham, Surrey, England

OIL REFINERY EQUIPMENT

Heat Exchangers (Liquid to Liquid)
Vapor Heat Exchangers
Final Condensers
Vacuum Condensers
Partial Condensers
Thermo Compressors.
Tubular Oil Stills
Fractionating Towers

Other Products Include

High Vacuum Condensers
Steam Jet Air Pumps (patented)
Centrifugal Pumps
Cooling Towers
WAINRIGHT Feed Water Heaters
Evaporators
WAINRIGHT Expansion Joints
Superheaters
Economizers
Chemical and Gas Heaters
Water Cooled Furnaces
Pulverized Coal Equipment

CRESCENT BRAND SEAMLESS DRAWN BRASS AND COPPER TUBES AND PIPE

BULLETINS DESCRIBING ANY OF OUR PRODUCTS WILL BE SENT UPON REQUEST

BRANCH OFFICES

Atlanta, Ga. Milwaukee, Wis.
Birmingham, Ala. New Orleans, La.
Boston, Mass. Philadelphia, Pa.
Chicago, Ill. Pittsburgh, Pa.
Cincinnati, Ohio Salt Lake City
Cleveland, Ohio San Francisco
Dallas, Texas *Foreign*
Denver, Colo. Montreal and
Detroit, Mich. Toronto, Ont.,
Kansas City, Mo. Canada.
Los Angeles, Cal. London, England.

118

REFINING AND MARKETING

Demand Is Too Big For Monopoly, Says Col. R. W. Stewart

DULUTH, Minn., Sept. 17.—In an address here at the Fourth Annual Industrial Veterans Dinner, Col. Robert W. Stewart of Chicago, chairman of the board of directors of the Standard Oil Co. of Indiana, said:

"The Standard Oil Co. of Indiana is a big business, and we are proud of that term, not so many years ago a designation denoting opprobrium. That is no longer true. The people of the United States have discovered that big business is not a liability to the public welfare, but an asset; that big business, once hounded from pillar to post, in spite of that hounding went right ahead and played a tremendous and decisive part in pushing to its amazing peak that unprecedented standard of living which the people of this nation today enjoy. It is only in unenlightened communities now, or in spots where that intangible, unreasoning thing called prejudice beclouds the minds of the citizenry, that it is not recognized that in this day of enormous production, stupendous consumption and world-wide markets, big business and big business alone can meet the exigencies of the situation; that big business and big business alone can sustain without disaster that tremendous stress and strain engendered by the admitted necessity of quantity production and quantity distribution. That does not exclude the necessity of little business. To round out our economic structure they must always exist as a complement to the larger enterprises, and for their mutual good, and for the nation's good, there should be co-operation and not warfare between them. Cut-throat competition never helped any business, and in the long run the consumer suffers as much as the throat cutters.

"The Standard Oil Co. of Indiana is the largest manufacturer of gasoline in the world, yet alone we could not supply the demand of the 11 states of the Middle West in which we market our products. If we had a monopoly we wouldn't know what to do with it. I suspect our enhanced problems of production and distribution would drive some of us to an early grave."

GRANDGERARD'S NEW POST

H. I. Grandgerard has joined Tide Water Oil Sales Corp. in the capacity of assistant export manager. Mr. Grandgerard is well known in export oil circles, particularly in connection with European business. During his 10 years of work in Europe, he served The Texas Company, the Union Petroleum Co., a Sinclair subsidiary, and the Acewood Petroleum Export Corp. With the latter corporation, he served as vice president and European representative, with headquarters at Paris. For the above companies, Mr. Grandgerard, at one time or other, handled practically all phases of export of oil work.

FUEL OIL EXTENSION

CHATHAM, Ontario, Sept. 17.—The Canadian Pacific Railway is constructing two new 25,000-gallon fuel oil tanks at its roundhouse at East Calgary, for fueling the oil-burning locomotives used on the mountain section of the railroad. Reports that the use of fuel oil would be extended to other parts of the system are officially denied.

I. C. C. ORDERS WESTERN TRUNK LINE CASE OPENED IN PART

Kansas and Oklahoma refiners during the past week were notified by the Interstate Commerce Commission of its voluntary decision to reopen a portion of the Western Trunk Line case. The action is considered by Oklahoma refiners as a step toward the improvement of their position in the case.

The order, in part, read as follows:

"At a general session of the Interstate Commerce Commission, held at its office in Washington, D. C., on the 7th day of September, A. D. 1927, upon consideration of the records and good cause appearing therefore, orders that the proceedings be and hereby are reopened for further consideration upon the records as made with respect to the rates on gasoline and other petroleum products taking the same rates to destinations on the west of the Mississippi River except St. Louis, Mo., within the territory traversed and bounded by the short line haul from Tulsa, Okla., to Mississippi River crossings from Davenport, Iowa, south to St. Louis."

Consideration of the case involving the territory east of the Mississippi River had been previously reopened and this order came as a surprise because it reopened territory intermediate to the east and the fact that the commission initiated the move to reopen the case indicates it is finding inequalities in the rates east of the Mississippi River compared to those west of the river and in order to make an adjustment has reopened the entire territory. It is also believed that any adjustments made will be reductions rather than further increases.

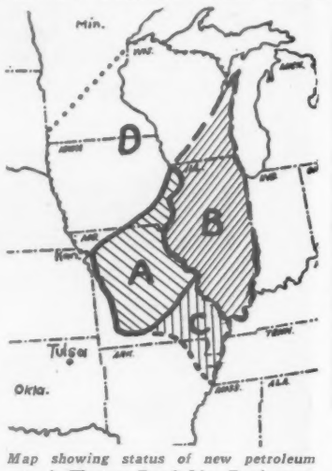
Refiners in both Oklahoma and Kansas are anxious to see reduced rates in each territory and if the commission finally finds it necessary to establish differentials between the Kansas and Oklahoma refiners both favor the reduction of the Kansas rates rather than increasing the Oklahoma rates as has been done previously. The railroads are also agreeable to holding rates near those originally in effect and have not petitioned for higher rates because they feel that pipe line competition will become still stronger as rates are increased with the result, the volume of products moved by freight will decrease faster than the tendency to increase the revenue from higher tariffs. This position has been taken by practically all railroads in the Southwest.

St. Louis Territory

Exception was made of St. Louis and its territory in this order, but this was done because the St. Louis territory had been reopened previously. Thus with the reopening of the territory included in the map as shown, under A, most of the original case has been reopened, the only excepton being the territory where general reductions have been made including the greater portion of Iowa, Wisconsin and southern Minnesota under D.

The map shown outlines the territory included in the original case, together with the status of the case with respect to certain sections. The territory included in A is the portion that has just been reopened while B had been reopened and the rates suspended until November 20, 1927.

The territory included in C is referred to as the St. Louis territory and the new rates in this area had been suspended and have been under consideration by the commission. The new rates in the territory included in D remain as established. The map clearly shows the key position held by the territory just opened with respect to the commission's consideration of the territory previously reopened or held pending. Certain new rates in A are higher than the present rates to points in B and C, yet the distance from Tulsa to B and C was greater than to A. This situation it is believed explains the commission's decision to reconsider the rates in the entire territory.



Map showing status of new petroleum rates in Western Trunk Line Territory as se: by Interstate Commerce Commission in the case of the Oklahoma and Kansas refiners. A—Territory reopened Sept. 7. B—Rates suspended until November 20, 1927. C—Rates still pending. D—New rates in effect and case closed.

MID-CONTINENT CORP. ADDS EIGHT SALESMEN

The Mid-Continent Petroleum Corp. has added eight salesmen to their offices already within the tank car sales territories in order to develop its program of distribution among jobbers, of its Diamond brand of oils. The company is correlating the work of the retail and wholesale agencies and is establishing a line of jobbers, who by contract, will share in the company's advertising program through the handling of the company's standardized products.

In the territory covered by the Chicago office, R. N. Carter will cover Indiana. C. M. Hathaway, Illinois, and F. C. Carew, Minnesota. The Kansas City office has added L. J. Olsen, who will cover the Kansas and Western Missouri territory, A. F. Morrison who will cover North and South Dakota, and V. B. Beaver. Fred Benner has been added to the St. Louis office to travel throughout northeastern Missouri, and L. V. Leaf has been added to the Louisville, Ky., office to cover Western Kentucky and Tennessee.

PROTEST INSPECTION FEES ON STATIONS

Several Kansas City jobbers have filed a restraining order in the Circuit Court to prohibit the enforcement of the law placed in effect on July 1, 1926 which requires each filling station to pay to the city an annual inspection fee of $150. A protest was made last year on the payment of this fee on the basis that it was excessive but a test case was averted then by the city and jobbers effecting a compromise on the payment of $60 per station for last year. Because of the large number of stations in Kansas City the case is attracting considerable attention and it may ultimately go to the State Supreme Court for decision.

MID-CONTINENT BUYS BLACK HAWK OIL CO.

CHICAGO, Sept. 17.—Jacob France, president of the Mid-Continent Petroleum Corp., announces from his office in Baltimore that the Mid-Continent Petroleum Corp. has purchased the business of the Black Hawk Oil Co., Waterloo, Iowa, and that it will be combined with its own system of distribution and operated as a part of the Mid-Continent Petroleum Corp. The price, he states, has not been definitely determined and will be paid in the common stocks of the Mid-Continent Petroleum Corp. The exact price depends on the result of inventories now being taken.

The original Hawkeye Oil Co., founded by A. H. Caward and associates under a South Dakota charter in 1908, was one of the first and for many years a leading independent distributor of petroleum products. After many years of successful operation the control of the company was purchased by the Producers & Refiners Corp., which organized the Hawkeye Oil Co., of Delaware and took over a number of distributing organizations some of which had been formed on a co-operative plan. The Caward interests after retiring from the Hawkeye Oil Co., founded the Black Hawk Oil Co. After a number of changes in management and control the entire property was secured by the Kistler interests who have been operating the combined company under the name of the Black Hawk Oil Co., with R. W. McDowell as president, D. C. Wixson as vice president, H. Sandhagen, secretary and L. J. Berry, treasurer.

There have been many reports of a purchase of the Hawkeye-Black Hawk Co. by the Mid-Continent Petroleum Corp. during the past two years. At the present time the Mid-Continent Petroleum Corp. is supplying on contract or by agreement the bulk of the products of all kinds sold by the Black Hawk Oil Co.

MISSOURI OIL MEN'S KANSAS CITY PROGRAM

The Missouri Oil Men's Association has practically completed the program for the Big Four State convention to be held in Kansas City, Mo., on October 4, 5 and 6. The tentative program has been outlined to include the following subjects: "Gasoline of Tomorrow," "Automobiles of Tomorrow," "Lubricants and Lubrication," "Fire Hazards and Fire Protection," "Credits and Collections," "Merchandising—Sales Promotion Help," "Publicity—Should a Country Jobber Advertise—if so How?", "Casual observation on a 16,000-mile automobile trip as a Motorist not as an Oil Man." By one of the foremost oil executives in the United States.

C. A. Knutson of Clear Lake, Iowa, has been chosen as the luncheon speaker. Arrangements have been made with the Western Passenger Association for rates one and one-half fare on round trip tickets and will be handled by the certificate method.

NEW OIL WAREHOUSE

CHATHAM, Ontario, Sept. 17.—Union Oil Co. of Canada is opening a new warehouse at Creston, B. C., in charge of S. M. Watson.

JOINS SIGNAL GASOLINE

Ross McCollum, formerly assistant manager of the casinghead gasoline department of the Standard Oil Co. of California, has taken a position as manager of the petroleum department of the Signal Gasoline Co. The latter company has been operating seven gasoline plants and only recently entered the production field.

This is the Diffusing Furnace with the fuel shut off. The fuel burns in the tunnel-like doghouse combustion chambers. In narrow settings, one doghouse is installed in the center of the furnace.

4 economies with *controlled* heat for stills

The photo shows how the doghouse combustion chambers of the Plibrico Diffusing Furnace look in operation. It was taken through the furnace door and shows only one of the chambers. See how the flame is confined—c o n t r o l l e d. These economies are obtained:

1 *No more buckling . . .*

No flame reaches the still bottom—no overheating—no bagging. Heating is by diffusion.

2 *Longer furnace life . . .*

The Diffusing Furnace is built of Plibrico, the double-life jointless lining. This means lower refractory maintenance cost and fewer production interruptions for furnace repairing.

3 *Uniform temperature*

Because the flame is confined to the doghouse combustion chambers, the temperature is easily controlled, and is easily kept uniform the entire length of the still.

4 *Greater fuel economy . . .*

More complete combustion is effected, because of the confinement of combustion to the tunnels. CO_2 averages almost 14%.

The engineering department of the Plibrico Jointless Firebrick Company, 1858 Kingsbury Street, Chicago, will be glad to make up blueprints showing how this ingenious furnace design can be adapted to your stills.

At the Petroleum Exposition

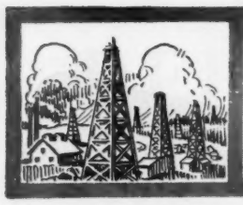
Plibrico headquarters will be established at

Hotel Mayo

Refinery men who would like to know more about the Diffusing Furnace are cordially invited to vis t with us at the Mayo Hotel. Mr. I. S. Pieters, vice president of the company and head of the Refinery Engineering Department, will be glad to talk with you.

The PLIBRICO Diffusing Furnace

—for old or new stills, oil or gas fired



REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

GASOLINE AND NAPHTHA

	Sept. 20		Sept. 13		Sept. 6	
OKLAHOMA (Group 3)—						
50-52 450 endpoint (Naphtha)	.06		.06		.06	
56-58 450 endpoint	.06		.06		.06	
58-60 450 endpoint	.06		.05⅞	.06	.05⅞	
58-60 437 endpoint (U. S. Motor)	.06⅛	.06¼	.06	.06¼	.06	.06¼
60-62 400 endpoint	.06⅛	.06⅝	.06⅛		.06¼	.06⅜
64-66 375 endpoint	.06⅞	.07	.06¾		.06½	.06⅝
68-70-360 endpoint	.07	.07¼	.06¾	.07	.06¾	.07
64-66 437 endpoint (blend)	.06⅛		.06	.06¼	.06	.06¼
KANSAS—						
58-60 437 endpoint (U. S. Motor)	.06⅜	.06⅝	.06¼	.06½	.06¼	.06½
NORTH TEXAS—						
56-58 437 endpoint	.05⅞		.05¾	.05⅞	.05¾	.05⅞
58-60 450 endpoint	.05¾	.05⅞	.05¾		.05¾	
58-60 437 endpoint (U. S. Motor)	.06	.06¼	.05⅞	.06	.05⅞	.06
60-62 400 endpoint	.06¼	.06⅝	.06¼		.06⅛	.06¼
64-66 390 endpoint	.06⅝	.06¾	.06⅝		.06¼	.06⅝
64-66 375 endpoint	.06¾		.06½		.06½	
68-70 360 endpoint	.07		.06¾	.07	.06¾	.07
64-66 437 endpoint (blend)	.06	.06⅛	.05⅞		.05⅞	
NORTH LOUISIANA—						
58-60 437 endpoint (U. S. Motor)	.06⅜	.06½	.06¼	.06½	.06¼	.06½
ARKANSAS—						
58-60 437 endpoint (U. S. Motor)	.06½	.06¾	.06¼	.06½	.06¼	.06½
PENNSYLVANIA—						
52-54 Naphtha	.07¾	.08	.07¾	.08	.08	.08¼
54-56 Naphtha	.08	.08¼	.08	.08¼	.08¼	.08½
58-60 Gasoline	.08	.08¼	.08	.08¼	.08¼	.08½
60 Gasoline	.08¾	.09	.08¾	.09	.08¾	.09
62 Gasoline	.09¼	.09⅝	.08¾	.09	.09⅛	.09⅝
64 Gasoline	.09½	.09¾	.08⅞	.09	.09½	.09¾
CALIFORNIA—						
58-60 437 endpoint (U. S. Motor) domestic	.08½	.09	.08¾	.09¼	.08¾	.09¼
CHICAGO DISTRICT (Based on Group 3)—						
50-52 450 endpoint (Naphtha)	.06	.06⅛	.06	.06⅛	.06	.06¼
56-58 450 endpoint	.06	.06⅛	.06	.06⅛	.06	
58-60 437 endpoint (U. S. Motor)	.06⅛	.06¼	.06⅛	.06¼	.06	.06½
60-62 400 endpoint	.06½		.06½	.06⅝	.06¼	.06½
64-66 375 endpoint	.06¾	.07	.06⅞	.07	.06½	.06¾
68-70 360 endpoint	.07¼	.07¾	.07¼	.07½	.07	
64-66 437 endpoint (blend)	.06¼		.06⅛	.06⅜	.06	.06¼

NATURAL GASOLINE

	Sept. 20		Sept. 13		Sept. 6	
OKLAHOMA (Group 3)—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.06	.06¼	.05½	.05¾	.05¾	.06
Grade AA, 80-87.9, 375 e.p., rec. 90%	.06	.06¼	.05½		.05¾	.06
Grade B, 76-83.9, 375 e.p., rec. 85%	.05⅝		.05¼		.05½	
Grade BB, 84-92, 375 e.p., rec. 85%	.05⅝		.05¼		.05½	
Grade C, 80-90, 375 e.p., rec. 78%	.05½	.05⅝	.05	.05¼	.05⅜	
NORTH TEXAS—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.06		.05½		.05¾	.05⅞
Grade AA, 80-87.9, 375 e.p., rec. 90%	.06		.05½		.05¾	
Grade B, 76-83.9, 375 e.p., rec. 85%	.05½		.05¼	.05⅝	.05½	
Grade BB, 84-92, 375 e.p., rec. 85%	.05½		.05¼		.05½	
Grade C, 80-90, 375 e.p., rec. 78%	.05⅜	.05½	.05		.05⅜	.05¼
NORTH LOUISIANA—						
Grade AA, 80-87, 375 e.p., rec. 90%	.06¼		.05¾		.06	
Grade BB, 84-92, 375 e.p., rec 85%	.05¾		.05½		.05¾	
Grade C, 80-90, 375 e.p., rec. 78%	.05¾		.05¼	.05½	.05½	.05¾
CALIFORNIA—						
75-85, 375, 390 endpoint	.07	.07½	.07½	.09	.07½	.09
CHICAGO DISTRICT (Based on Group 3)—						
Grade A, 72-79.9, 375 e.p., rec. 90%	.06	.06¼	.05½	.05¾	.05¾	.06
Grade AA, 80-87.9, 375 e.p., rec. 90%	.06	.06¼	.05½		.05¾	.06
Grade B, 76-83.9, 375 e.p., rec. 85%	.05⅝		.05¼	.05⅜	.05½	
Grade BB, 84-92, 375 e.p., rec. 85%	.05⅝		.05¼		.05½	
Grade C, 80-90, 375 e.p., rec. 78%	.05⅜		.05	.05¼	.05¼	.05½

BURNING OIL

	Sept. 20		Sept. 13		Sept. 6	
KANSAS—						
41-43 water white Kerosene	.04⅝	.04½	.04⅝	.04½	.04¼	.04½
OKLAHOMA (Group 3)—						
41-43 water white Kerosene	.04¼	.04⅜	.04½	.04⅜	.04	.04¼
42-44 water white Kerosene	.04⅜	.04½	.04⅜	.04½	.04⅜	.04½
NORTH LOUISIANA—						
41-43 prime white Kerosene	.04⅜	.04½	.04¼	.04½	.04¼	.04½
NORTH TEXAS—						
41-43 water white Kerosene	.03⅝	.03¾	.03⅝	.03¾	.03⅝	.03¾
40-42 water white Kerosene	.03½	.03⅝	.03½	.03⅝	.03½	.03⅝
ARKANSAS—						
41-53 water white Kerosene	.04	.04¼	.04	.04¼	.04	.04¼
PENNSYLVANIA—						
43 Kerosene prime white	.05⅝	.05⅞	.05⅝	.05⅞	.05⅝	.05⅞
45 Kerosene water white	.06	.06¼	.05¾	.06	.05¾	.06
46 Kerosene water white	.06¼	.06½	.06¼	.06½	.06	.06¼
47 Kerosene water white	.06¾	.07	.06½	.06¾	.06½	.06¾
300 Mineral Seal	.07	.07¼	.06¾	.07	.06¾	.07
CALIFORNIA—						
38-40 water white Kero. (high burning test)	.05	.05½	.05	.05½	.05	.05½
Engine distillate, 43-45 445 endpoint	.08	.08½	.08	.08½	.08	.08½
Engine distillate, 42-44 480 endpoint	.07¾	.08	.07⅞	.08	.07¾	.08
CHICAGO DISTRICT (Based on Group 3)—						
41-43 water white Kerosene	.04½	.04¼	.04½	.04¼	.04	.04¼
42-44 water white Kerosene	.04½	.04⅝	.04⅝	.04½	.04⅜	.04½

FUEL OILS

	Sept. 20		Sept. 13		Sept. 6	
KANSAS—						
22-26 Fuel Oil	.85	.92½	.87½	.95	.87½	.95
18-22 Fuel Oil	.82½	.85	.82½	.85	.82½	.85
32-36 Gas Oil	.02⅝		.02⅝		.02⅝	
38-40 Distillate	.03⅛	.03¼	.03⅛	.03¼	.03⅛	.03¼
OKLAHOMA (Group 3)—						
Below 18 Fuel Oil	.75	.80	.77½	.80	.77½	.80
18-22 Fuel Oil	.80		.80		.80	
22-26 Fuel Oil	.80	.82½	.80	.82½	.82½	
24-26 Fuel Oil	.82½	.85	.82½	.85	.82½	.85
26-30 Fuel Oil	.87½		.87½		.85	.87½
28-30 Fuel Oil	.92½		.92½		.90	
32-36 Gas Oil (dark)	.02½		.02½		.02½	.02⅝
32-36 Gas Oil (straw overhead)	.02⅝		.02⅝		.02½	.02⅝
36-38 Distillate	.03		.03		.03	.03⅛
38-40 Straw Distillate	.03⅛	.03¼	.03⅛	.03¼	.03⅛	.03¼
NORTH TEXAS—						
24-26 Fuel Oil (sellers' cars)	.80	.82½	.80	.82½	.80	
32-36 Gas Oil (straw)	.02¼	.02½	.02¼	.02½	.02¼	.02½
38-40 Straw Distillate	.03		.03		.03	
NORTH LOUISIANA—						
18-20 Fuel Oil	1.10		1.10	1 12½	1.10	1.15
32-36 Gas Oil	.02¾		.02¾	.02⅞	.03	.03⅛
ARKANSAS—						
36-38 Distillate	.03¼	.03½	.03¼	.03½	.03¼	.03½
32-36 Gas Oil (straw)	.03¼		.03¼		.03¼	
16-20 Refinery Fuel Oil	1.00	1.05	1.00	1.05	1.00	1.05
GULF COAST (South Texas)—						
Gas Oil	.04		.04		.04	
Fuel Oil	1.60	1.65	1.60	1.65	1.60	1.65
PENNSYLVANIA—						
30-34 Fuel Oil	.04¼	.04½	.03¾	.04¼	.03¾	.04¼
36-40 Fuel Oil	.04½	.04¾	.04	.04½	.04	.04½
CALIFORNIA—						
33-36 Distillate	.03¾	.04	.03¾	.04	.03¾	.04
27-32 Distillate	.03¼	.03¾	.03¼	.03¾	.03¼	.03¾
*15-20 Fuel Oil, Bunkers (at tide water)	1.00		1.00		1.00	
15-20 Fuel Oil (cargo lots)	.90		.90		.90	
27 plus Diesel	1.15	1.19	1.15	1.19	1.15	1.19
CHICAGO DISTRICT (Based on Group 3)—						
24-26 Fuel Oil (sellers' cars) Group 3	.85	.87½	.85	.87½	.85	.87½
22-26 Fuel Oil (sellers' cars) Group 3	.82½	.85	.82½	.85	.82½	.85
18-22 (Group 3)	.77½	.80	.77½	.80	.80	.82½
16-20 Smackover	1.10	1.12½	1.10	1.15	1.10	1.12½
32-36 Gas Oil (zero)	.02¾	.03	.02¾	.03	.02½	.02¾
32-36 Gas Oil (industrial)	.02½	.02⅝	.02⅝		.02⅝	.02¾
36-38 Distillate	.03		.03		.03	.03⅛
38-40 Straw Distillate	.03¼		.03⅛	.03¼	.03¼	.03⅜

*Bunkers.

LUBRICATING OIL AND WAX

	Sept. 20		Sept. 13		Sept. 6	
OKLAHOMA (Group 3)—						
100 vis., 2 color, 20-25 cold test	.06¼	.06½	.06¼	.06½	.06¼	.06½
100 vis., 3 color, 20-25 cold test	.06	.06¼	.06	.06¼	.06	.06¼
150 vis., 3 color, 20-25 cold test	.08¼	.08½	.08¼	.08½	.08¼	.08½
150 vis., 4 color, 20-25 cold test	.08	.08¼	.08	.08¼	.08	.08¼
180 vis , 3 color, 23-28 cold test	.09¾	.10	.09¾	.10	.09¾	.10
180 vis., 4 color, 23-28 cold test	.09½	.09¾	.09½	.09¾	.09½	.09¾
180 vis., 5 color, 23-28 cold test	.09¼	.09½	.09¼	.09½	.09¼	.09½
200 vis., 3 color, 23-28 cold test	.10	.10½	.10	.10½	.10	.10½
200 vis., 4 color, 23-28 cold test	.10⅛	.10⅝	.10⅛	.10⅝	.10⅛	.10⅝
200 vis., 5 color, 23-28 cold test	.10¼	.10½	.10¼	.10½	.10¾	.10½
240 vis., 3 color, 25-30 cold test	.13¾	.14	.13¾	.14	.13¾	.14
240 vis., 4 color, 25-30 cold test	.13¼	.13½	.13¼	.13½	.13¼	.12½
240 vis., 5 color, 25-30 cold test	.12¼	.12½	.12¼	.12½	.12¼	.12½
280 vis., 3 color, 25-30 cold test	.15½	.16	.15½	.16	.15½	.16
280 vis., 4 color, 25-30 cold test	.15	.15½	.15	.15½	.15	.15½
280 vis , 5 color, 25-30 cold test	.14	.14½	.14	.14½	.14	.14½
Cylinder Stocks:						
600, steam refined, light green	.07	.09	.07	.09	.07	.09
600, steam refined, dark green	.05	.06	.05	.06	.05	.06
190-200 vis. @ 210 Bright Stock	.31	.33	.31	.33	.31	.33
150-160 vis. @ 210 Bright Stock	.26		.26		.26	
Waxes:						
124-126 White Crude Scale Wax	.02⅝		.02⅜	.02⅝	.02⅜	.02⅝
PENNSYLVANIA—						
34 Neutral	.07½	.08	.07½	.08	.07½	.08
34 Sundebloom Neutral	.08¾	.09	.08¾	.09	.08¾	.09
36 Miners' Neutral	.07½	.07¾	.07½	.07¾	.07½	.07¾
150, 3 color	.28	.28½	.28	.28½	.28	.28½
180, 3 color	.32¼	.32½	.32¼	.32½	.32¼	.32½
200, 3 color	.34	.34¼	.34	.34¼	.34	.34¼
220, 3 color	.36	.36½	.36	.36½	.36	.36½
600, steam refined	.09½	.10	.09½	.10	.09½	
635, steam refined	.10½	.11	.10½	.11	.09½	.10
650, steam refined	.11½	.12	.11½	.12	.11	.11½
660, Pennsylvania flash	.15	.15½	.15	.15½	.15	.15½
600, Pennsylvania flash	.15	.15½	.15	.15½	.15	.15½
*550, E filtered	.17¼	.18	.17¼	.18	.17¼	.18
*600, E filtered	.18½	.19	.18½	.19	.18¾	.19¼
600, E filtered	.16½	.17	.16½	.17	.16½	.17
600, D filtered	.25½	.26	.25½	.26	.25½	.26
550, E filtered	.17½	.18	.17½	.18	.17½	.18
550, D filtered	.21½	.22	.21½	.22	.21½	.22
Pennsylvania Bright Stock	.33½	.35½	.33½	.35¼	.33½	.35½
†122-124 White Crude Scale Wax	.03	.03¼	.03	.03¼	.03	.03¼
†124-126 White Crude Scale Wax	.03	.03¼	.03	.03¼	.03	.03¼

*At Warren, Pa. †At New York City.

GULF COAST (South Texas)—						
No. 2 color, 100 vis., pale oil	.07	.07½	.07	.07½	.07	.07½
No. 3 color, 200 vis, pale oil	.09½	.10	.09	.09½	.09	.09½
No. 3 color, 300 vis., pale oil	.10½	.11½	.10	.10½	.10	.10½
No. 3½ color, 500 vis., pale oil	.12½	.13	.11½	.12	.11½	.12
No. 4 color, 750 vis., pale oil	.15½	.16	.14½	.15½	.14½	.15
No. 5 to 6 color, 200 vis., red oil	.08	.08½	.07¼	.07¾	.07¼	.07¾
No. 5 to 6 color, 300 vis., red oil	.09½	.10	.09	.09½	.09	.09½
No. 5 to 6 color, 500 vis., red oil	.10½	11.	.10	.10½	.10	.10½
No. 5 to 6 color, 750 vis., red oil	.13½	.14	.13	.13½	.13	.13½
No. 2 color, 200 vis., pale filtered	.12¾	.14	.12¾	.14	.12¾	.14
No. 2 color, 300 vis., pale filtered	.14	.14½	.14	.14½	.14	.14½
No. 2½ color, 500 vis., pale filtered	.15½	.16½	.15½	.16½	.15½	.16½
No. 2½ color, 750 vis., pale filtered	.20	.20½	.20	.20½	.20	.20½

REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

CALIFORNIA—						
130 vis., 2½-3 color	.09	.10	.09	.10	.09	.10
200 vis., 2½-3 color	.10	.10½	.10	.10½	.10	.10½
300 vis., 3-3½ color	.10½	.11	.10½	.11	.10½	.11
350 vis., 3½-4 color	.11	.12	.11	.12	.11	.12
400 vis., 3½-4 color	.13	.14	.13	.14	.13	.14
Red Neutral:						
200 vis., 4½-5 color	.08½	.09	.08½	.09	.08½	.09
300 vis., 5-6 color	.09	.09½	.09	.09½	.09	.09½
400 vis., 5-6 color	.11	.11½	.11	.11½	.11	.11½
500 vis., 4½-5 color	.11¼	.12	.11¼	.12	.11¼	.12
500 vis., 5-6½ color	.11	.11½	.11	.11½	.11	.11½
600 vis., 6 plus color	.12	.12½	.12	.12½	.12	.12½

Note: Bright stocks are not manufactured commercially on the Pacific Coast.

NEW YORK (BAYONNE) REFINERY PRICES

	Sept. 20	Sept. 13	Sept. 6
Gasoline, U. S. Motor, 58-60 437	.08¼	.08¼	.08¼
Kerosene, water white, 41-43	.06½	.06½	.06½
*Fuel Oil, bunker "C," 14-16, per bbl.	1.65	1.65	1.65
*Fuel Oil, Diesel, 28-30, per bbl.	2.10	2.10	2.10
Gas Oil, 28 plus	.05½	.05½	.05½
25 pale Paraffin Oil	.12	.12	.12
28 pale Paraffin Oil	.07¼	.07¼	.07¼
285 red Paraffin Oil	.11½	.11½	.12½
250 red Paraffin Oil	.10½	.10½	.11½
225 red Paraffin Oil	.10	.10	.10½
200 red Paraffin Oil	.09½	.09½	.09½
Refined Wax:			
120-122 a.m.p., per lb.	.03⅞	.03⅞	.03⅞
125-127 a.m.p., per lb.	.04¼	.04⅛	.04
130-132 a.m.p., per lb.	.04¾	.04¾	.04½
135-137 a.m.p., per lb.	.05¾	.05⅝	.05½
Petrolatum, in bbls., carload lots, per lb.:			
Dark Green	.01⅞	.01⅞	.01⅞
Amber	.03⅜	.03⅜	.03¼
Extra amber	.03¾	.03¾	.03½
Cream	.05¾	.05¾	.05⅜
Lily white	.07⅜	.07⅜	.07¼
Snow white	.08⅜	.08⅜	.08¼

*Lighterage 6.5c a barrel extra.

NEW YORK (BAYONNE) EXPORT PRICES

	Sept. 20	Sept. 13	Sept. 6
Gasoline, U. S. Motor, 58-60 437, in cases	.2440	.2440	.2440
Kerosene, standard white, in cases	.1615	.1615	.1615
Kerosene, water white, in cases	.1715	.1715	.1715
600 steam refined cylinder stock, in bbls.	.16½	.16½	.17
635 steam refined	.19	.19	.19
650 steam refined	.20	.20	.20
600 Pennsylvania flash	.23	.23	.24
630 Pennsylvania flash	.32	.32	.32
600 Warren E	.25	.25	.26
600 Oil City E	.24½	.24½	.24½
Light 135 Bright Stock	.43	.43	.42
Dark 135 Bright Stock	.41	.41	.40

LOS ANGELES EXPORT PRICES

	Sept. 20		Sept. 13		Sept. 6	
Kerosene, water white	.04	.04¼	.04⅛	.04¼	.04⅛	.04⅜
U. S. Motor Gasoline, 53-55 437 e.p.	.06¼	.06¾	.06	.06¼	.06	.06¼

CALIFORNIA CRUDE PRICES
***Standard Oil Co.-Union Oil Co. (Effective April 1, 1927)**

Gravity—	Fullerton, Seal Beach, Long Beach, Huntington Beach, Richfield, Rosecrans-Dom'guez, Torrance-Inglewood	Whittier, La Habra, Montebello	Kern River, Newhall-McKittrick, Midway-Sunset, Elk Hills, Buena Vista Hills, Belridge	Coyote	Santa Fe Springs	Coalinga	Wheeler Ridge	Santa Maria, Ventura, Orcutt, Salt Lake
	1	2	3	4	5	6	7	8
14°	.85	.85	.75	.85	....	.75	.75	.85
15°	.85	.85	.75	.85	....	.75	.75	.85
16°	.85	.85	.75	.85	....	.75	.75	.85
17°	.85	.85	.75	.85	....	.75	.75	.85
18°	.85	.85	.75	.85	....	.75	.75	.85
19°	.85	.85	.76	.85	....	.75	.75	.85
20°	.86	.85	.77	.85	....	.76	.76	.85
21°	.86	.85	.79	.86	.85	.77	.77	.85
22°	.87	.85	.81	.87	.86	.78	.78	.85
23°	.88	.85	.83	.88	.85	.79	.79	.85
24°	.89	.85	.85	.89	.85	.80	.80	.85
25°	.90	.86	.87	.90	.86	.81	.81	.86
26°	.92	.87	.89	.91	.87	.83	.82	.87
27°	.94	.88	.91	.92	.88	.85	.82	.88
28°	.96	.89	.93	.93	.89	.87	....	.89
29°	.98	.90	.96	.94	.91	.89	....	.91
30°	1.00	.91	.99	.95	.93	.91	....	.93
31°	1.03	....	1.02	....	.95	.93	....	.95
32°	1.06	....	1.05	....	.97	.95	....	.97
33°	1.09	....	1.08	....	.99	.97	....	.99
34°	1.12	....	1.11	....	1.01	.99	....	1.01
35°	1.15	....	....	....	1.03	1.01	....	1.03
36°	1.18	....	....	....	1.06	....	....	1.06
37°	1.21	....	....	....	1.09	....	....	1.09
38°	1.24	....	....	....	1.12	....	....	1.12
39°	1.27	....	....	....	1.15	....	....	1.15
40°	1.30	....	....	....	....	....	....	....
41°	1.33	....	....	....	....	....	....	....
42°	1.36	....	....	....	....	....	....	....

*Column 1—Long Beach, Seal Beach and Huntington Beach crudes, 14 to 32 degrees, inclusive; Richfield and Fullerton, 14 to 30 degrees; Torrance and Inglewood, 14 to 28 degrees; Domingues, 24 to 42 degrees. Rosecrans crude ranges from 14 to 42 degrees, but only Union Oil Co. posts below 24 degrees.

Column 2—Whittier crude, 14 to 22 degrees; Montebello, 14 to 30 degrees.

Column 3—Kern River, Newhall and McKittrick, 14 to 19 degrees; Midway-Sunset, Buena Vista and Elk Hills, 14 to 32 degrees; Los Hills and Belridge, 14 to 34 degrees.

Column 5—Salt Lake, 14 to 19 degrees, inclusive; Santa Maria, 14 to 30 degrees; Ventura and Orcutt, 14 to 39 degrees. Posted only by Union Oil Co.

CRUDE OIL GRAVITY PRICE TABLE

Gravity—	Okla., Kans., N. C. Tex., La.-Ark.	Smackover, Ark.	Stephens, Ark.	Gray County (Texas Panhandle)	Crane, Upton, Pecos, Crockett Counties (West Texas)	Salt Creek, Wyo.	Grade B & Light Crude (G. Coast)	Somerset, (South Central Texas)
	1	2	3	4	5	6	7	8
Below 24	....	1.00	....	....	....	....	....	....
24 and above	....	1.25	....	....	....	....	....	....
Below 25	....	....	....	....	....	....	1.15	....
25 to 25.9	....	....	....	....	....	....	1.17	....
Below 26	....	....	....	....	.60	....	....	....
26 to 26.9	....	....	....	....	.60	....	1.19	....
27 to 27.9	....	....	....	....	.60	....	1.21	....
Below 28	****	....	1.00	....	....	....	....	....
28 to 28.9	1.12	....	1.02	.80	.60	....	1.23	....
29 to 29.9	1.14	....	1 04	.82	.60	1.14	1.25	....
30 to 30.9	1.16	....	1.06	.84	.60	1.16	1.27	....
31 to 31.9	1.18	....	1.08	.86	.60	1.18	1.29	....
32 to 32.9	1.20	....	1.10	.88	.60	1.20	1.31	1.05
33 to 33.9	1.22	....	....	.90	.60	1.22	1.33	1.07
34 to 34.9	1.24	....	....	.92	.60	1.24	1.35	1.09
35 to 35.9	1.26	....	....	.94	.60	1.26	1.37	1.11
36 to 36.9	1.28	....	....	.96	.60	1.28	....	1.13
37 to 37.9	1.30	....	....	.98	....	1.30	....	1.15
38 to 38.9	1.32	....	....	1.00	....	....	....	1.17
39 to 39.9	1.34	....	....	1.02	....	....	....	....
40 to 40.9	1.36	....	....	1.04	....	....	....	....
41 to 41.9	1.38	....	....	1.06	....	....	....	....
42 to 42.9	1.40	....	....	1.08	....	....	....	....
43 to 43.9	1.42	....	....	1.10	....	....	....	....
44 to 44.9	1.44	....	....	1.12	....	....	....	....
45 to 45.9	1.46	....	....	....	....	....	....	....
46 to 46.9	1.48	....	....	....	....	....	....	....
47 to 47.9	1.50	....	....	....	....	....	....	....
48 to 48.9	1.52	....	....	....	....	....	....	....
49 to 49.9	1.54	....	....	....	....	....	....	....
50 to 50.9	1.56	....	....	....	....	....	....	....
51 to 51.9	1.58	....	....	....	....	....	....	....
52 and above	1.60	....	....	....	....	....	....	....

Column 1—Magnolia Petroleum Co. posted new schedule September 14, making price below 30 gravity $1.05 per barrel, with 2 cents increase per degree higher in gravity, taking 30-30.9 gravity at $1.16 as basis, with a top price of $1.60 for 52 and above.

Oklahoma: Prairie Oil & Gas Co., Sinclair Oil & Gas Co., Gypsy Oil Co., March 12; Carter Oil Co., The Texas Company, March 14.

North Central Texas—(Including Ranger, Mexia, Powell, Richland, Wortham, Lytton Springs (Southwest Texas), Iatan and Panola (Magnolia only), Currie, Nocona, Moran and Corsicana light): Texas, Prairie, Sinclair and Gulf, March 12; The Texas Company, Humble Oil & Refining Co., March 14.

Kansas—Prairie, Sinclair, March 12; Carter, Texas, March 14.

Arkansas and North Louisiana—(Caddo, Bull Bayou, Crichton, DeSoto, Haynesville, Homer and El Dorado only): Standard Oil Co. of Louisiana, March 14; The Texas Company, March 14; Magnolia Petroleum Co., Pine Island, Haynesville and Bull Bayou, El Dorado, Gulf Pipe Line Co., March 14.

Column 2—The Texas Company, Atlantic, March 17. On September 17 Louisiana Oil & Refining Co. posted 90 cents for Smackover crude below 24 gravity and $1.15 for 24 gravity and above. On September 20 the Standard Oil Co. of Louisiana, Magnolia Petroleum Co. and Gulf Pipe Line Co. met this reduction.

Column 3—Atlantic Oil Producing Co. March 14.

Column 4—Humble Oil & Refining Co. and Gulf Pipe Line Co., March 14. On August 23 Magnolia Petroleum Co. posted flat 75 cents.

Column 5—Humble Oil & Refining Co., August 23; Kay County Gas Co., Magnolia Petroleum Co., and Gulf Pipe Line Co., August 24.

Column 6—Midwest Refining Co., March 12. All crude over 37 gravity, $1.30 per barrel.

Column 7—Humble Oil & Refining Co. and other major buyers (schedule ends "35 and above"), March 14, with exception of Magnolia Petroleum Co., which stops at 31 degrees gravity. Sun Pipe Line Co. posts 2 cents differential for each degree above 35 gravity and $1.47 for 40 gravity and above.

Column 8—Grayburg Pipe Line Co. and Pioneer Oil & Refining Co., April 7.

****Prices for crude below 28 gravity; Oklahoma, Kansas and Texas, Magnolia Petroleum Co., $1.10, March 12; Arkansas, Nor.h Louisiana, March 14. Other companies, 2 cents less for each degree with exception of Humble Oil & Refining Co., which pays $1.12 for crude below 28 degrees gravity.

CRUDE OIL PRICES

OKLAHOMA, KANSAS, NORTH AND EAST CENTRAL TEXAS

*Corsicana heavy (March 14, 1927)	$1.00
Other fields	See gravity table

*Posted by Magnolia Petroleum Co.

TEXAS PANHANDLE

*Carson County	$ .75
*Hutchinson County	.75
*Wheeler County	.75
Gray County	See gravity table

*Humble Oil & Refining Co.
Magnolia Petroleum Co., Gulf Pipe Line Co., and Kay County Gas Co., August 23.

WEST TEXAS

*Iatan (same as North Texas).	
Crane-Upton-Crockett	See gravity table

*Includes Howard County and Westbrook Fields. Kay County Gas Co. pays $1.05 for Howard County crude, effective May 21.

ARKANSAS-NORTH LOUISIANA

Cotton Valley (March 17)	$1.00
Bellevue (Feb. 24, 1927)	1.25
Urania (Sept. 15, 1927)	.90
East El Dorado (Sept. 20)	.90
Other fields	See gravity table

Note—Cotton Valley and Bellevue, Standard Oil Co. of Louisiana, Gulf Refining Co. and Magnolia Petroleum Co.; Urania, Louisiana Oil Refining Corp.; East El Dorado, Magnolia Petroleum Co.

GULF COAST

(Goose Creek, Hull, Liberty, West Columbia, Orange, Boling, Sour Lake, Humble, High Island, Pierce Junction and Spindletop).

†Grade A, (March 14)	$1.30
Grade B	See gravity table
*Jennings, La. (March 14)	1.05
†Saratoga, Batson, Dayton (March 14, 1927)	1.20
**Markham (March 14)	1.00

*Gulf Pipe Line Co. †Sun Pipe Line Co. †Humble Oil & Refining Co. and other major buyers. **The Texas Company.

SOUTH CENTRAL AND SOUTHWESTERN TEXAS

*Luling (May 5)	$1.00
†Mirando (March 14)	1.00
Rockdale-Minerva (April 15):	
38-38.9 gravity	1.27
39-39.9 gravity	1.29
40 and above	1.31
*Thrall	....
Calilhan (May 15)	1.75
Lytton Springs (Lockhart)	See gravity table
Somerset	See gravity table

*Posted by Magnolia Petroleum Co. Thrall prices same as north central Texas less 19¼ cents per cwt. freight.
†Magnolia Petroleum Co., Humble Oil & Refining Co., Crown Central Pipe Line Co.

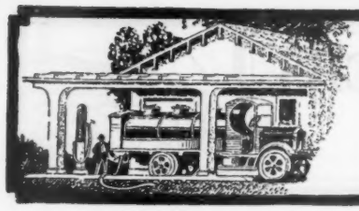
ROCKY MOUNTAIN STATES

Ohio Oil Co.-Midwest Refining Co.
(Effective March 14)

Rock Creek, Wyo. (March 12)	$1.25
Salt Creek	See gravity table
Big Muddy (March 12)	1.25
Mule Creek (May 1)	1.10
Grass Creek, heavy	.90
Grass Creek, light	1.33
Elk Basin (March 12)	1.33
Lance Creek (March 12)	1.33
Poison Spider	1.00
Notches	.65
Rex Lake (February 22)	1.10
Osage	1.33
Lost Soldier (contract)	.95
Greybull-Torchlight	1.33
Hamilton Dome	.85
Cat Creek (Mont.)	1.33
Sunburst (Mont.)	1.35
Artesia (March 12)	1.00
Hogback (N. Mex.) (March 14)	1.33

Note: Salt Creek, Osage, Cat Creek, Greybull and Hogback posted by Midwest Refining Co., and the remainder by the Ohio Oil

(Continued on Page 350)



TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns Sept. 20.

ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO. (INDIANA)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Chicago dist.	14.0	18.0	2.0	12.0
Decatur, Ill.	10.5	12.5	2.0	12.1
E. St. Louis	15.1	17.35	2.0	11.2
Joliet	16.4	18.4	2.0	12.3
Peoria	12 0	12.0	2.0	12.1
Quincy	16.2	18.2	2.0	11.9
Davenport, Ia.	17 5	19 5	3 0	12.3
Des Moines	17 0	19.0	3.0	12 3
Keokuk	17.5	19 5	3.0	12.3
Sioux City	17 1	19.1	3.0	11 9
Duluth, Minn.	15 5	17.5	2.0	12 9
Minneapolis	14.0	14 0	2 0	12 9
Mankato	17 1	19.1	2.0	12 7
LaCross, Wis.	17 2	19.2	2.0	13 0
Milwaukee	16 1	18 1	2 0	11.9
Madison	16 3	18 3	2 0	12 1
Detroit, Mich.	17.8	19.8	3.0	13.7
Grand Rapids	17.7	19.7	3.0	13.6
Saginaw	17.9	19.9	3.0	13.8
Evansville, Ind.	17 0	19 0	3.0	13 0
Ft. Wayne	17 4	19 4	3 0	13 4
Indianapolis	15 2	15.2	3 0	12 2
South Bend	17.4	19.4	3 0	13.4
Fargo, N. D.	17 0	19.0	2 0	14 9
Huron, S. D.	19 5	21.5	4 0	13 9
Sioux Falls	15.0	17.0	4.0	13.4
*K. C., Mo.	14.9	16.9	3.0	10.6
*Springfield	16 8	18.8	3 0	11 5
*St. Louis	15 6	17.9	2 5	11 3
*St. Joseph	14.5	16.5	3 0	11 2
Wichita, Kans.	14 8	16.8	2 0	10.8
Bartlesville, Ok.	15.8	17.8	3.0	10.8

*State tax 2 cents; remainder city tax.

NAPHTHAS

	Tank wagon	Tank car
Oleum spirits	16.0	10.75
V. M. & P. naphtha	18.0	12.75
Cleaner's naphtha	18 0	13 75
Stanisol	19.0	14.75

Tank wagon prices f.o.b. Chicago; tank car prices f.o.b. Whiting.

STANOLIND FURNACE OIL

Less than 100 gallons	9.0
100 to 799 gallons	8.0
800 or more gallons	7.5

Tank wagon prices of gasoline subject to discount of 1 cent a gallon on dumps of 50 gallons or more throughout territory except Chicago district where discount applies only to dumps of 100 gallons. Kerosene subject to 1 cent discount on dumps of 50 gallons or more.

Outside the Chicago district, the following quantity discount schedule is in effect on monthly tank wagon deliveries of gasoline: 6,000 gallons or more, 1½ cents; 10,000 gallons or more, 2 cents; 15,000 gallons or more, 2 cents. These discounts include the 1 cent allowed on dumps of 50 gallons or more at one delivery.

Within the Chicago district, the following quantity discount schedule is in effect on tank wagon deliveries of gasoline: 750 to 2,000 gallons, one-half cent; 2,000 to 3,000 gallons, three-fourths cent; 3,000 to 6,000 gallons, 1 cent; 6,000 to 10,000 gallons, 1¼ cents; 10,000 to 15,000 gallons, 2 cents; 15,000 gallons or more, 3 cents. These discounts are in addition to the special discount of 1 cent on dumps of 100 gallons or more at one delivery.

If the quantity bought during the year is equal to or exceeds 12 times the agreed monthly quantity, the discount is paid or credited on the entire quantity at the close of the term less the monthly payments made during the year.

OHIO

Standard Oil Co. (Ohio)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
All Ohio points	19 0	21.0	3.0	14.5

SOUTHWESTERN DISTRICT

Magnolia Petroleum Co.*

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Dallas, Tex.	14.0	17.0	3.0	11.0
Fort Worth	14.0	17.0	3.0	10.0
Houston	14.0	17.0	3.0	15.0
San Antonio	14.0	16.0	3.0	11.0
El Paso	16 0	18.0	3 0	16 0
Texarkana	15.0	18.0	3.0	12.0
Muskogee, Ok.	15 0	18 0	3.0	9 0
Okla. City	15 0	18 0	3 0	9.0
Tulsa	15.0	18 0	3 0	9 0
Ft. Smith, Ark.	16.0	19 0	5 0	12 0
Little Rock	16.0	18.0	5.0	12.0

*The following is the schedule of discounts on quantity gasoline sales adopted by the Magnolia Petroleum Co. in Oklahoma: Over 750 gallons a month, one-half cent; over 2,000 gallons, three-quarters cent; over 3,000 gallons, 1 cent; over 4,500 gallons, 1¼ cents; over 6,000 gallons, 1½ cents; over 8,000 gallons, 1¾ cents; over 10,000 gallons, 2 cents. If the quantity bought during the year is 12 times the monthly agreed purchases, the discount will be paid or credited on the entire quantity for the year less any monthly purchases.

The schedule on service station deliveries is: Over 200 gallons a month, 1 cent; over 300 gallons a month, 1¼ cents; over 400 gallons, 1½ cents; over 500 gallons a month, 1¾ cents; over 600 gallons, 2 cents. The same rule applies for annual purchases in the tank wagon discounts.

CENTRAL SOUTH DISTRICT

Standard Oil Co. (Louisiana)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
*N. Orleans, La.	14.5	18.5	3.0	14.0
Baton Rouge	14 0	17 0	2 0	12 5
Alexandria	15 0	18.0	2 0	14 0
LaFayette	15 0	18.0	2 0	13.5
Lake Charles	15.5	18 5	2.0	14.0
Shreveport	15.5	18 5	2 0	13 0
Kn'xville, T'nn.	19 5	22.5	3 0	16 0
Memphis	15 0	17.0	3.0	14 0
Chattanooga	19 5	22.5	3 0	15 0
Nashville	18 0	21.0	3 0	15 0
Bristol	19 0	22.0	3 0	14 0
Lit. Rock, Ark.	18.0	21.0	5.0	13.0

*Tax of 3 cents includes city tax of 1 cent.
*Louisiana kerosene prices include 1-cent state tax and 1-cent parish tax.

SOUTHERN DISTRICT

Standard Oil Co. (Kentucky)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Atlanta, Ga.	16.0	18.0	4.0	15.5
Augusta	19.0	22.0	4.0	16.5
Macon	19.0	22.0	4.0	16.5
Savannah	16.0	18.0	4.0	14.5
Birm'h'm, Ala.	18 0	21 0	4.0	15.5
Mobile	17 0	20.0	4 0	15 0
Montgomery	19 0	22.0	5 0	16 5
Clarks'le, Miss.	17.0	20 0	4 0	12 5
Jackson	17.0	20.0	4.0	13.5
Natchez	16.5	19 5	4.0	14 0
Gulfport	18 5	21 5	6 0	14.0
Vicksburg	16 5	19 5	4.0	14 0
Jack'ville, Fla.	15.0	18.0	5.0	14.0
Miami	17.0	20.0	5.0	15.5
Pensacola	16.0	19.0	5.0	15.0
Tampa	14.0	17.0	5.0	14.0
Lexington, Ky.	18 0	21.0	5 0	15 5
Covington, Ky.	19 0	22 0	5 0	15 5
Louisville	19.0	22.0	5.0	15.0

In addition to the state tax of 2 cents on gasoline, Montgomery has city tax of 1 cent on gasoline. Kerosene prices in Georgia includes 1 cent tax. In Florida, an inspection fee of 0.125 cent; in Alabama, an inspection fee of one-half cent on kerosene only. Pensacola tax includes 1 cent city levy. Gulfport tax includes privilege tax of 2 cents in addition to state tax.

PENNSYLVANIA-DELAWARE AND PART NEW ENGLAND

Atlantic Refining Co.

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Pittsburgh, Pa.	16.0	*22.0	...	14 0
Philadelphia	14 0	17.0	...	14 0
Scranton	16 0	*22 0	...	14 0
Allentown	16 0	*22.0	...	14 0
Altoona	16.0	*22 0	...	14 0
Erie	14 0	*18 0	...	14 0
Dover, Del.	19 0	22.0	3.0	14 0
Wilmington	19 0	22 0	3.0	14 0
Spring'd, Mass.	17 0	17 0	...	15.0
Worchester	17 0	17 0	...	15 0
Boston	17 0	17.0	...	15.0
Providence, R.I.	19.0	19.0	3.0	15.0
Hartford, Conn.	21 0	22.0	3 0	15 0
New Haven	21.0	22.0	3.0	15.0

*Includes tax of 3.0 cents. Pennsylvania tax is collected by the dealer and paid by him direct to the state.

NEW YORK AND PART OF NEW ENGLAND DISTRICT

Standard Oil Co. (New York)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Albany, N. Y.	17.0	19.0	...	15.0
*New York	17.0	19.0	...	15.0
Buffalo	17.0	19.0	...	14.0
Rochester	13 0	16.0	...	14.0
Syracuse	17.0	19.0	...	15.0
Boston, Mass.	17 0	19 0	...	15 0
Augusta, Me.	20 0	22 0	3 0	15 0
M'nch't'r, N. H.	18.0	22 0	3 0	15 0
Burlington, Vt.	20.0	22.0	3.0	15.0

*Price in steel barrels.

PACIFIC COAST DISTRICT

Standard Oil Co. (California)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
San Francisco	17.0	21.0	3.0	15.5
Pueblo	18.0	18.0	3.0	15.5
Los Angeles	16.5	20.5	3.0	15.5
Reno, Nev.	22 0	26.0	4 0	19 0
Portland, Ore.	17 5	21.5	3 0	16 5
Seattle, Wash.	16.5	20.5	3 0	16 5
Tacoma	16 5	20 5	3 0	16 5
Spokane	20 5	24.5	3.0	20.5
Phoenix, Ariz.	23.0	26.0	3.0	20.5

ATLANTIC COAST DISTRICT

Standard Oil Co. (New Jersey)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Atlantic City	18.0	20.0	3.0	14 0
Newark, N. J.	18 0	20 0	2 0	14.0
Annapolis, Md.	20 0	23 0	4 0	12 0
Paltimore	20 0	23.0	4 0	10.0
Cumberland	20 0	23.0	4 0	14.0
Washington	18 0	21.0	2.0	12 0
Danville, Va.	20 5	...	4.5	14 0
Norfolk	20 5	23 5	4 5	12 0
Petersburg	20.5	23 5	4.5	14 0
Roanoke	20.5	23 5	4 5	14 0
Richmond	18 5	21 5	4 5	14 0
Ch'rlst'n, W.Va.	20 0	23.0	4.0	14 0
Keyser	20 0	....	4 0	14 0
Parkersburg	17 0	20.0	4 0	14 0
Wheeling	20 0	23 0	4.0	14 0
Charlotte, N. C.	20 0	23 0	4.0	14.0
Hickory	20 0	23 0	4.0	14 0
Mt. Airy	20 0	23 0	4 0	14 0
Salisbury	20.0	23 0	4.0	14 0
Charl'stn, S. C.	20.0	23 0	5 0	14 0
Columbia	20.0	20.0	5.0	14.0

NEBRASKA

Standard Oil Co. (Nebraska)

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Omaha	14.25	16 25	2 0	12 25
McCook	14 75	14 75	2 0	11 50
Norfolk	16 75	18.75	2 0	12 75
N. Platte	17 75	19 75	2.0	13 50
Scottabluff	17.25	19.25	2.0	13.00

ROCKY MOUNTAIN DISTRICT

Continental Oil Co.

	Gasoline Tank wag'n	Gasoline Service station	Incids tax of	Kero. Tank wag'n
Denver, Colo.	18.0	20.0	3 0	12 5
Pueblo	18 0	20 0	3 0	14 5
Grand Jnctn.	21.5	23 5	3 0	18.0
Casper, Wyo.	18 0	20.0	3 0	13 0
Cheyenne	19 0	21 0	3.0	14 5
Butte, Mont.	22 0	22 0	3 0	19 0
Helena	22 5	24 5	3 0	19 0
Salt Lake, Utah	21.0	23 0	3 5	17 0
Boise, Idaho	23 5	25.5	4 0	19.0
Twin Falls	23.5	25 5	4 0	19.0
Albu'que, N. M.	21.0	24.0	5.0	17.0

TANK WAGON CHANGES

September 1—Standard Oil Co. of Kentucky increased the kerosene price one-half cent throughout Georgia to equalize the 1-cent tax made effective on that date along with the elimination of the half-cent inspection fee. The gasoline tax was increased in Georgia from 3½ to 4 cents but the half-cent inspection fee was eliminated then, leaving the tank wagon and station prices the same.

September 6—Magnolia Petroleum Co. increased the gasoline station price 3 cents at Fort Smith, Ark., making the new price 20 cents.

September 8—Magnolia Petroleum Co. decreased the gasoline tank wagon price 2 cents at Little Rock, Ark., making the new price 16 cents.

September 15—Standard Oil Co. of Indiana reduced the gasoline tank wagon and station prices 5.7 cents at Decatur, Ill., making the new prices 10.5 cents and 12.5 cents, respectively.

September 20—Magnolia Petroleum Co. decreased the gasoline station price 1 cent in Fort Smith, Ark.

September 20—Standard Oil Co. of Indiana reduced the gasoline tank wagon and station prices to 15.2 cents in Indianapolis, Ind.

CRUDE CHANGES

September 14—Magnolia Petroleum Co. posed new prices on Mid-Continent crude purchased by the company on the gravity basis, advancing all grades of 30 gravity or above 10 cents per barrel, and posting $1.05 per barrel for oil below 30 gravity.

September 14—Humble Oil & Refining Co. posted Lytton Springs crude on same gravity price schedule as other Mid-Continent crudes purchased by the company on the gravity basis.

September 15—Louisiana Oil & Refining Corp. decreased Urania crude 10 cents per barrel.

September 17—Louisiana Oil & Refining Co. decreased Smackover crude 10 cents per barrel, making the new postings 90 cents for oil below 24 gravity and $1.15 for oil over 24 gravity.

September 20—Magnolia Petroleum Co. and Standard Oil Co. of Louisiana met the above cut in Smackover crude made by the Louisiana Oil & Refining Co. Magnolia Petroleum Co. reduced East El Dorado crude 10 cents to 90 cents per barrel.

ROCKEFELLER MEDALS TO OLDEST OIL MEN

John D. Rockefeller has authorized the International Petroleum Exposition to present a gold and a silver medal to the oldest men in point of service in the oil industry. The silver medal will be awarded to the oil man of longest experience present at the opening ceremonies of the Petroleum Exposition in Tulsa on Saturday, September 30, while the gold medal will be awarded to the oldest oil man in the United States. In both cases the number of years in service will be counted and not the actual age of the man.

On the face of the medal will be a profile of John D. Rockefeller while on the reverse side an oil derrick will be an outstanding feature. The medals will be suitably inscribed.

A telegram from George H. Jones, chairman of the board of the Standard Oil Co. of New Jersey, on Tuesday to W. G. Skelly, president of the International Petroleum Exposition, gave Mr. Rockefeller's authorization of the gifts.

PENNSYLVANIA MARKETS

OIL CITY, Pa., Sept. 19.—In the Pennsylvania refined market during the past week gasoline and naphtha were again weaker. Kerosene was stronger. Neutrals and wax continued to show strength and fuel oil was stronger than it has been. Bright stocks and cylinder stocks were unchanged.

CRUDE OIL PRICES

(Continued from Page 349)

Co. Both companies post Grass Creek light and Elk Basin.

EASTERN STATES

Joseph Seep Purchasing Agency
(Effective August 1.)

Penna Grade Oil in New York Transit Line (New York)	$2.46
Bradford District Oil in National Transit Lines (Pennsylvania)	2.66
Penna Grade Oil in National Transit Lines (Pennsylvania)	2.56
Penna Grade Oil in Southwest Pennsylvania Lines (West Virginia)	2.56
Penna Grade Oil in Eureka Pipe Line lines (Pennsylvania)	2.50
Penna Grade Oil in Buckeye Pipe Line lines (Ohio) (August 23)	2.25
Cabell Grade Oil in Eureka Pipe Line lines (West Virginia) March 16	1.40
Corning 35-cent grade oil in Buckeye Pipe Line Co.'s line (March 17)	1.35
Corning 25-cent grade oil in Buckeye Pipe Line Co.'s lines (March 17)	1.45
Somerset Oil in Cumberland Pipe Line lines (Kentucky) March 16	1.50
Ragland Grade Oil in Cumberland Pipe Line lines (Kentucky)	.95
Keister (Pennsylvania)	1.10

MIDDLE WESTERN STATES

Ohio Oil Co.
(Effective March 14)

Lima	$1.71
Wooster	1.57
**Saginaw, Mich., Saginaw Sand (May 27)	2.06
Illinois	1.60
Indiana	1.48
Princeton	1.60
Plymouth	1.33
Waterloo (Nov. 17, 1926)	1.35
*Western Kentucky	1.33
**Saginaw, Mich., Berea Sand (May 27)	1.95
†Cumberland, Barren, Clinton and Monroe Counties, Kentucky (March 16)	1.50
‡Oil in lines of Stoll Oil Refining Co. in Oil City, Ky. (March 16, 1927)	1.50
†Clay County, Tennessee (Nov. 18)	2.35
§Oil Springs (Canada)	2.18
§Petrolia (Canada)	2.11

*Posted by Ohio Oil Co.
†Posted by Paragon Development Co.
‡Posted by Stoll Oil Refining Co.
§Posted by Imperial Oil Co., Ltd.
**Posted by Sun Oil Co.

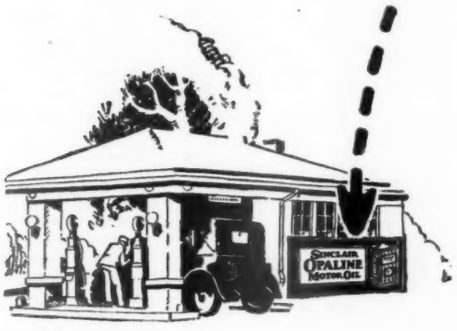
MEXICAN CRUDE

Note—Due to the fact that the exportation of Tuxpam light crude oil has become a negligible factor, prices will no longer be published.

*Panuco heavy (f.o.b. Mex. ports)	$1.16

*17.496c tax.

This Sign will tell motorists you sell correct lubrication



THIS sign *always* identifies the station along-the-highway where a motorist can buy *the Oil* which will give him correct lubrication.

The motorist is learning that where he sees this sign he gets the *right grade* of motor oil to seal the power in his engine at every degree of wear.

Only Opaline Motor Oil is recommended on the basis of engine-wear—*as indicated by the mileage on the speedometer!* And only Opaline Dealers have this sound method for increasing gallonage.

Sinclair supplies the Dealer with several grades of Opaline, and with the Sinclair Recommendation Index which tells when each grade should be sold. The authorized Opaline Dealer asks the motorist his mileage, the Index tells the grade—the motorist drives away with the kind of lubrication which brings him back for more!

May we tell you about this successful method of selling *correct lubrication* with the full line of Opaline Motor Oils?

SINCLAIR REFINING COMPANY, INC.

Also Makers of Sinclair Gasoline and H-C Gasoline

45 NASSAU STREET, NEW YORK

Atlanta Boston Chicago Houston Kansas City

Entire contents copyrighted 1927 by Sinclair Refining Company, Inc.

Oil Securities Decline During Week

Magnolia's Advance Anticipated. Mid-Continent Petroleum Registers Sharp Advance on News of Program

The oil stocks seem to have anticipated the Magnolia Petroleum Co.'s crude price advance which came during the week, and after its announcement the interest lagged and the securities were permitted to drop to their position of one week ago.

Mid-Continent Petroleum registered a sharp advance to 34⅝ cents chiefly upon the news that the company was interested in a combination of marketing facilities including the purchase of the Black Hawk Oil Co., which has over 350 filling stations in northern Oklahoma and southern Kansas. It is reported that this company has had an option upon the Black Hawk Oil Co. for some time and exercised it this week. With the additional marketing facilities and a program of sales expansion which the company has started, additional outlet for its crude products seems assured.

After several postponements, the Barnsdall regular dividend was declared this week.

Dixie Gulf Gas

Financing aggregating $14,000,000, proceeds of which will be used for construction of one of the largest natural gas pipe line transportation systems in the country, has been underwritten by Blyth, Witter & Co., Tucker, Anthony & Co., Goddard & Co., Moore, Leonard & Lynch and Hale, Waters & Co. The first phase will be an offering soon of $9,500,000 Dixie Gulf Gas Co. first mortgage 6½ per cent sinking fund bonds, Series A, with stock purchase warrants. The new pipe line will be completed by 1928. Its length, exclusive of gathering lines, will be 300 miles, extending from the properties of the Reserve Natural Gas Co. of Louisiana, near Waskom, Tex., to Port Arthur and Houston. The diameter of the main trunk line will be 22 inches. Capacity of the system will be 150,000,000 feet of gas daily. Contracts have already been made with The Texas Company, Pure Oil Co., Houston Gulf Gas Co. and Dixie Gas & Fuel Co.

Pan American Petroleum

Attorneys for the Pan American Petroleum & Transport Co. and Pan American Western Petroleum Co. appeared in the United States District Court at Los Angeles September 12 and filed checks and drafts totaling $13,009,507, covering the payment of the face amount of the judgment awarded to the Government for crude oil taken from the Elk Hills Naval Reserves prior to revocation of Government leases last March through the United States Supreme Court decision voiding the Pan American leases, and interest at 7 per cent. Attorneys spent several hours arguing the legality of the Federal decision imposing the interest and question was taken under advisement by Federal Judge Paul McCormick, who rendered the first decision annulling the leases.

J. J. Cotter, representing the Pan American Petroleum & Transport Co., presented a draft for that company for judgment amounting to $9,889,299, plus $1,201,143 for interest. Pan American Western's share of the payment totaled $1,556,861 plus $362,204 interest.

Standard Oil of Indiana

The stockholders of the Standard Oil Co. of Indiana approved the increase in authorized capital stock to $375,000,000 from $250,000,000, increasing the number of shares to 15,000,000 of $25 par value from 10,000,000 of the same par value.

Stockholders also voted to issue 37,500 shares in exchange for 150,000 shares of Pan American Eastern Petroleum Corp. common stock, on the basis of one for four. Pan American Eastern has a controlling stock interest in the Pan American Petroleum & Transport Co.

Reports are that the Standard Oil Co. of Indiana plans the declaration of a 50 per cent stock dividend in the near future. With the exchange of Pan American Eastern common, requiring only 37,500 shares of Standard of Indiana stock, the latter will have about 5,825,882 shares of stock unissued out of 15,000,000 authorized.

The Pan American Eastern Corp. is a holding company formed in 1925 by a New York banking syndicate, Standard of Indiana and English interests, to acquire control of the Pan American Petroleum & Transport Co. The Eastern company's capital consisted of $17,500,000 debentures, $15,000,000 preferred stock and 550,000 shares of common. Purchase of E. L. Doheny's stock in Pan American Petroleum was on the basis of $70 a share, and 501,000 shares were purchased. Half the payment was in the form of debentures and half in cash.

Imperial Oil

Imperial Oil, Ltd., stock has been exceptionally strong lately, advancing to over 55, a new high price for all time.

C. O. Stillman, president of the company, has flatly denied rumors of a pending special distribution by the company to shareholders, saying "there is no basis for them." He says furthermore that the oil industry is not in a flourishing condition at present and the movement in oil stocks seems to be of a speculative rather than commercial inspiration.

"There is absolutely no development in Imperial Oil, Ltd., affairs at present," he states, "nor in our opinion is there likely to be which would account in any way for the existing movement in the market value of its shares. There has been no consideration of any further distribution to shareholders of the company."

An official of Imperial Oil confirmed the purchase by the company of Galena Signal Oil Co. of Canada, a subsidiary of the Galena Signal Oil Co. He states the purchase was completed in July, it having been decided that Imperial Oil was in a better position to look after the Canad an undertaking. No change in the directorate or personnel is contemplated.

Pan American Western

The Pan American Western Petroleum Corp. and subsidiaries report for the six months ended June 30, 1927, net profit of $163,814 after depreciation, depletion, interest and Federal taxes, equivalent to 32 cents a share earned on the combined 100,010 no par value shares of Class A and 400,000 shares of Class B. This compares with $1,627,118, or $3.25 a share, on the combined stocks in the first half of 1926.

The net loss for the quarter ended June 30, 1927, was $93,324 after the above charges. This compares with net profit of $260,139 or 52 cents a share on the combined shares in the preceding quarter and net profit of $1,710,551 or $3.42 a share in the second quarter of 1926.

The consolidated income account for the six months ended June 30, 1927, compares as follows:

	1927	1926
Gross sales	$14,845,565	$16,422,758
Operating costs	11,439,324	11,806,589
Gross profit	$3,409,241	$4,616,169
Deprec., depl., interest and Federal taxes	3,245,427	2,989,051
Net profit	$163,814	$1,627,118

At a meeting of the directors of the Pan American Western Petroleum Co., officers were re-elected.

Pure Oil

The Pure Oil Co., Refiners Pipe Line Co. and Pure Oil Pipe Line Co. have applied to the Public Service Commission for approval to sell the pipe line owned by the Producers & Refiners Pipe Line Co. Hearing will be held in Pittsburgh September 28. The line extends from Coraopolis, Allegheny County, into Washington and Greene Counties to a point between Pennsylvania and West Virginia, to the Southwest Pennsylvania Pipe Lines.

Union Tank Car

The consolidated balance sheet of the Union Tank Car Co. as of June 30, 1927, compares with 1926 as follows:

Assets

	1927	1926
*Property, plant and equipment	$40,475,640	$38,781,009
Amortization, debt discount	206,029	.....
Inventory	609,352	2,180,297
Accrued income	38,557	.....
Cash	1,954,209	779,520
Marketable securities	3,510,019	3,699,401
Accounts receivable	1,499,949	1,510,576
Total	$48,293,755	$46,950,803

Liabilities

Preferred stock	.....	$12,000,000
Common stock	$30,734,000	24,564,400
Car trus. notes	13,000,000	.....
Accounts payable	491,670	318,015
Accrued interest and state taxes	168,220	.....
**Reserves	892,921	919,163
Surplus	3,006,944	9,149,225
Total	$48,293,755	$46,950,803

*After depreciation. **Includes Federal taxes.

Reiter-Foster Oil

Reiter-Foster Oil Corp., reports for six months ended June 30, 1927, profit of $110,852 after expenses, interest and dry hole contributions but before depreciation, depletion and taxes.

Income account of Reiter-Foster Oil Co. for six months ended June 30, 1927, as follows:

Gross income	$171,519
Expenses, interest, dry holes, etc.	60,667
*Profit	$110,852

*Before depreciation, depletion, taxes, etc.

Washington Oil

Washington Oil Co. declared a dividend of $1, payable September 20 to stock of record September 14. On June 20 a dividend of $1 was declared and on March 21 a dividend of $2 was paid.

White Eagle Dividend

The White Eagle Oil & Refining Co. declared its regular quarterly dividend of 50 cents per share, payable October 20, 1927, to stockholders of record September 30, 1927.

NEW YORK STOCK EXCHANGE—LIST OF ACTIVE STOCKS

Stocks—	Par	Clos. quot. Sept. 19	Sept. 12	1927 High	1927 Low	1926 High	1926 Low	1925 High	1925 Low
Amerada Corp.	..	2⅞	2⅞	3⅞	2⅞	3⅞	2⅜	..	..
Atlantic Refining, com.	100	119	120¾	128	107	128⅜	97	117⅛	95½
Barnsdall "A"	25	23⅛	23⅛	35½	20⅜	32½	23½	33½	18⅜
California Petroleum, com.	25	21⅝	23	32⅝	21½	33⅛	30⅜	34⅜	23⅜
Houston Oil	100	144⅞	152⅛	173¼	60⅛	75	50¼	85	5
Independent Oil & Gas	..	20⅝	21	32¼	17⅜	34	20¼	41¾	13½
Louisiana Oil	10	10⅝	11¼	18⅛	10⅜	19⅜	12	23¼	13⅜
Maracaibo	..	14¼	14⅜	22⅜	11¼	27⅜	18⅜	35½	20⅜
Marland	..	35⅞	36⅜	54⅛	31	63⅜	41⅛	63⅛	39½
Mid-Continent Petroleum	..	34⅛	30¼	39⅝	21	41	25¼	38	2⅜
National Supply	50	84⅜	87	95¾	76	84⅜	55½	71	54¾
Oil Well Supply	25	34½	35	44⅜	31¼	36	20	38	33⅜
Pan American, B	50	50⅝	50	66⅞	45⅛	72⅜	56⅛	83⅜	59½
Pan American, Western B	..	20½	20⅛	37⅞	39	43	34	94⅛	37¼
Phillips Petroleum	..	42¼	43⅜	60¼	42¼	54⅞	41⅛	71⅛	3¼
Producers & Refiners	50	25⅛	27⅜	3⅜	16⅜	26	11	32⅝	12½
Pure Oil, com.	..	26⅝	26¼	33⅛	26	31	25¼	33⅜	2½
Royal Dutch, N. Y. sh.	13.40	45⅛	46⅜	54⅛	48⅛	57⅜	49⅜	57⅜	48¼
Shell Transport	10	42¼	43⅛	47	42¼	48⅞	42	49	3⅜
Shell Union, com.	..	25⅜	26½	31⅜	25⅜	30⅞	24	28⅜	1⅛
Simms Petroleum	10	17	16	22⅜	14½	25⅝	16½	28½	18⅜
Sinclair Consolidated	..	17½	17	22⅞	16½	24⅞	16⅜	24½	17
Skelly Oil	25	26½	27½	37⅜	24¼	37½	27	32½	21⅜
Standard of California	25	53½	55	60⅜	50⅜	63½	54	67¼	52½
Standard of New Jersey, com.	25	39⅛	40¼	41⅜	35⅛	46⅜	37½	47½	38⅜
Standard of New York	25	31¼	31⅝	34⅛	29⅞	47¼	30⅝	48⅝	40
Sun Oil Co.	..	31¼	32	37⅞	30	41⅝	30⅛	43⅜	38½
The Texas Company	25	50⅜	50¼	58	45	58	48	55	41⅜
Texas Pacific Coal & Oil	10	13⅜	14½	18⅞	12	17⅛	12½	23⅜	11
Tide Water Associated Oil	..	16⅝	16⅜	23½	15½	21	17	..	..
Transcontinental	..	7⅝	7⅞	8⅝	3⅜	5½	3	5⅝	3½
Union Oil of California	25	43⅜	43	56½	39⅜	53⅜	37¼	43⅜	31½
Union Tank, com.	100	111	111	115	95	120⅜	84½	134	118
White Eagle Oil & Refining	..	23½	23	27½	22	29⅜	25½	21⅜	25⅝
Standard Oils									
Anglo-American Oil	£1	18⅛	18⅜	21⅝	18¾	19⅜	16½	26¾	17½
Borne Scrymser	25	60	61	69	49½	75	65	240	235
Buckeye Pipe Line	50	56½	55½	58	45	59½	42	72	63½
Cherebrough Manufacturing Co.	25	108	107	109	76½	81½	63	74	9¼
Continental	10	18⅛	18⅜	22⅜	16⅝	25⅜	1⅛	21½	21⅜
Cumberland Pipe Line	100	90	90	137	90	137	102	156	128
Eureka Pipe Line	100	54	55	56¼	47	53½	43	96	61¼
Galena Signal, com.	100	8	8	13½	7½	32½	9⅝	68½	23½
Humble Oil & Refining Co.	25	62⅜	61¾	62¾	54	99⅝	52	99	4½
Illinois Pipe Line	100	162	161½	164⅝	123⅜	144	171	164½	124
Imperial Oil	..	53¼	53⅝	54	37¾	39¾	32½	39¼	27¼
Indiana Pipe Line	50	7½	69	72½	61	68	52¼	84	8½
International Petroleum Co.	10	30⅝	31¾	34⅝	28½	35¼	28⅝	25¾	2⅛
National Transit Co.	12.50	15¼	15⅝	17½	13⅝	30⅝	27¼	25½	15⅛
New York Transit	100	34	33⅝	36	31½	61½	27¼	70	50
Northern Pipe Line	100	84	83	88	70	80½	64	58	67⅛
Ohio Oil Co.	25	60⅜	60⅞	64¼	52	67⅜	55⅜	76½	60
Penn-Mex Fuel	25	22	23½	31	12	24¾	15	44	19
Prairie Oil & Gas	25	51	50⅝	55½	45⅝	60¼	48	65½	45⅜
Prairie Pipe Line	100	183	182½	185	132	137½	122½	129¾	105
Solar Refining Co.	100	182	182	201½	178	212	184½	159	200
South Penn Oil	25	37	36¼	37	31½	50	3	197	139
Southwest Pa. Pipe Line	100	68	70	77	55½	56	47½	84	50
Southern Pipe Line	50	18½	18½	27¼	18½	27	24	103	13
Standard of Indiana	25	73⅜	73⅜	74¼	67¼	76¼	60½	79⅜	69¼
Standard of Kansas	25	16¾	16⅝	20⅞	15⅜	36½	16½	46	30¼
Standard of Kentucky	25	122⅞	123½	123½	111⅝	134⅜	108	137	114⅜
Standard of Nebraska	25	44¼	45	49½	45	51½	42	270	231
Standard of Ohio, com.	100	78	79	354	294	363	192½	369	338
Swan & Finch, com.	25	16½	17	17	15	21	18	27	12
Vacuum Oil	25	127	128	134	95¼	109⅜	94½	109½	80½
Miscellaneous									
Gulf Oil Corp. of Pa.	25	92¼	91	96½	86¼	95	82½	98¼	63½

*Bid, no sales. †Old stock. ‡New stock.

Quotations furnished by W. J. Wollman & Co.

The Oil and Gas Journal's weekly average price of 20 representative petroleum stocks listed on the New York Stock Exchange was as follows:

Sept. 19	60.83	Aug. 15	61.05	July 11	59.36
Sept. 12	61.20	Aug. 8	61.33	July 2	58.99
Sept. 5	60.60	Aug. 1	60.38	June 27	58.79
Aug. 29	60.41	July 25	60.55	June 20	60.46
Aug. 22	61.58	July 18	60.36	June 13	59.91

Technical Questions Answered

BY CHARLES K. FRANCIS, PH.D., TECHNICAL EDITOR

The Question and Answer Department of The Oil and Gas Journal is devoted to the manufacturing branches of the oil industry.

Those connected with the refining of crude petroleum, the manufacture of natural gasoline and closely allied industries are invited to submit their problems to Dr. C. K. Francis, technical editor. The department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products.

Questions should be submitted in as much detail as possible so as to assure a satisfactory answer.

All inquiries should be signed and if other than the given initials are to be used please indicate the desired letters.

Questions involving patented processes, intricate formulas and calculations and estimates of costs, for obvious reasons, cannot be answered. The replies will appear on this page within a reasonable time.

CHARGES FOR TRANSPORTING CRUDE OIL THROUGH PIPE LINES

What are the charges for transporting crude oil of different gravities from the Mid-Continent district, say Oklahoma, through pipe lines to Chicago, St. Louis and New York? What is the length of these lines?—J. J. M.

The pipe line charge from Cushing, Okla., to Chicago, a distance of approximately 700 miles, is 46 cents; to St. Louis, a distance of approximately 410 miles, is 37½ cents; to Bayonne, N. J., (which is close to New York), a distance of about 1,460 miles, is 76¾ cents. All of these rates are on the basis of 1 bbl. containing 42 gallons. There is no distinction made because of any difference in gravity.

In addition to the above charge there is usually a gathering charge of 20 cents a barrel, and there may be a further charge for selling.

BERGIUS PROCESS FOR MAKING GASOLINE FROM COAL

Will you give me an outline of the Bergius process for making gasoline from coal? Does this process yield a gasoline equal to that obtained from crude oil?—L. B.

Numerous descriptions of the Bergius process have been printed. Among these will be found several extended articles in The Oil and Gas Journal. The following is extracted from the description by Gurwitch in Petroleum Technology, Gurwitch-Moore.

This is a liquid phase operation involving the use of extremely high pressures and the simultaneous introduction of hydrogen. In some of his early experiments Bergius found that if coal was mixed with oil and then subjected to hydrogenation at very high pressures, about 160 atmospheres, the coal was converted to the extent of about 90 per cent into oil. The essential principles were perfected in his cracking process.

As in the usual practice of cracking with formation of gas and coke, the latter substance is a considerable hindrance to the continuity of working, he has developed his hydrogenation process as a means for the prevention of the formation of carbon during the cracking reaction. The formation of carbon is largely dependent upon the carbon content of the raw material, a high carbon content resulting in the deposition of large quantities of coke. Bergius found that by applying hydrogen at high temperatures and pressure practically no coke and little gas were produced. The commercial unit consists of a long horizontal steel cylinder, inside of which is a cast iron vessel. Circulating between the two vessels is a current of highly-heated inert gas at a pressure equal to that of the inner vessel. Oil and hydrogen are sprayed into the chamber, the light products being removed as fast as they are formed, while the heavier high-boiling fractions fall back and undergo hydrogenation. The process is continuous, the heavy residue being continuously withdrawn.

The still of the commercial unit is 30 feet by 3 feet, is fitted with stirring devices, and is heated by passing nitrogen through coils heated in the circuits and thence to the annular space between the inner and outer walls. The plant has a daily capacity of 50 tons, and as no carbonization occurs it is practically possible to run for long periods. The final pressure attained may be as high as 280 atmospheres. When coal is to be subjected to hydrogenation it is ground to pass 400-per-inch mesh and mixed with the oil. The mixture can then be circulated by a pump.

The nature of the light products obtained by the hydrogenation of coal has been determined from oil prepared from English coal. The yield of gasoline was 10 per cent. on the weight of the charge, having a pale yellow color and odor similar to cracked distillate.

After treatment with acid and caustic soda the gasoline tested as follows:

Gravity	70 A.P.I.
Initial	104 F.
50 per cent	172
95 per cent	316
Endpoint	320

The character of the hydrocarbons was determined according to the following analysis:

	Per Cent
Unsaturates	3.1
Aromatics	7.6
Naphthenes	51.7
Paraffins (difference)	37.6

The properties indicated suggest that the product is very similar to the gasoline which is obtained from petroleum products by the cracking process.

ALCOHOL FROM GASOLINE

Can you give me some information about the process for making alcohol from gasoline? This is said to be a special kind of alcohol which can be used in making varnish and paints?—J. F. D.

Evidently this is a reference to the process for making amyl alcohol, $C_5H_{11}OH$, which is the active alcohol commonly separated from fuel oil. It is a secondary alcohol, a liquid with an unpleasant pungent odor, boiling at about 265 degrees Fahrenheit. It is used as a solvent for certain gums and is used in the preparation of special extracts and perfumes.

The description given below is from an article by S. D. Kirkpatrick, in Chemical and Metallurgical Engineering, May, 1927, Vol. 34, page 276.

The first step in the process is the separation of pentane, as a by-product during the extraction of gasoline from natural gas by fractionation in special columns.

The conversion of pentane into amyl alcohol is to first chlorinate the pentane, which is effected by the direct action of chlorine and then to hydrolyze the chloride thus obtained by means of a caustic soda solution. The chlorine is pumped in liquid form at the rate of about 1,200 pounds per hour.

The pentane liquid is vaporized in a tank heated by steam coils, and the chlorine, in the form of gas or vapor, is added in measured quantity. The mixture is preheated to 212 degrees Fahrenheit up to which temperature no reaction occurs, and the preheated product passes then to tubular reaction units where the chlorination takes place. The products of this reaction are amyl chloride, and free hydrochloric acid. Much heat is generated in the reaction which has to be conducted away by water cooling. The hydrochloric acid leaves the reaction units in vapor form; it passes through a condensing system into an absorption plant. The amyl chloride containing some unchanged pentane is distilled and the pentane is returned to the reaction units. The hydrochloric acid produced averages about 25 tons daily; it is water white in color, and of high purity, finding a ready market in the locality of Charleston.

Before proceeding to the hydrolyzing stage, the amyl chloride is purified by a second distillation. It is then mixed with the required amount of 8 to 10 per cent caustic soda solution, which is piped from the Belle Alkali Works. The hydrolysis takes place in the presence of a catalyst, the nature of which is not disclosed and the amyl chloride becomes converted into its corresponding amyl alcohols, with the formation of an equivalent quantity of sodium chloride. The alcohols thus produced are redistilled and carefully fractionated to yield the product known as pentasol. This product is chemically pure amyl alcohol, but is, nevertheless, a mixture of the various isomers of that compounds. The properties of these various isomers are very similar, and it is not necessary to separate them for commercial use. About 50 per cent of the whole consists of the two primary iso-amyl alcohols boiling at approximately 265 degrees Fahrenheit, about 25 per cent of primary normal methyl amyl alcohol boiling at 276 degrees Fahrenheit, and the remaining 25 per cent is made up of two other amyl alcohol isomers known as diethyl carbinol, with a boiling point of 240 degrees Fahrenheit, and methyl propyl carbinol boiling at about 246 degrees Fahrenheit.

Much of the product is marketed in the form of pentacetate, which is derived from the amyl alcohol by treating it with acetic acid in the presence of sulphuric acid as a catalyst.

PROPERTIES AND TESTS FOR VASELINE

What properties should be used to show the purity of vaseline and what are the tests to be used in grading it?—W. T. A.

Vaseline should not be darker than a yellow color, the consistency similar to that of butter, free from granular or crystalline wax. The usual melting point is between 95 and 105 degrees Fahrenheit. The method for this may be found in Bureau of Mines Technical Paper 323-A.

Vaseline is insoluble in water, very slightly soluble in pure alcohol, easily soluble in chlorform, ether and gasoline. Free alkali and acid should not be present when tested as follows: Place five parts of the sample in a bottle, add 25 parts of hot distilled water and shake. No color should form upon the addition of two drops of phenolphthalein, but the deep pink color of alkaline phenolphthalein should be produced upon adding 0.1 cc. of tenth normal caustic potash.

Saponifiable fats and resins may be tested for by shaking five drops of vaseline in a mixture containing three cc. of caustic soda and 20 cc. of water heated to the boiling point. There should be no precipitate after cooling and neutralizing with hydrochloric acid.

There should be no black deposit or color formed when the sample is mixed with an equal volume of pure sulphuric acid.

PURITY OF BENZOL AND ITS PROPERTIES

What is the purity of the benzol which is used for blending with gasoline? I would also like to know the distillation test on it, the gravity, weight per gallon and any other information you have about it?—R. W. T.

The commercial benzol is a product which has been washed and most of the sulphur, together with tars and gums, removed. It contains from about 85 per cent upward of benzol and is known in the trade as 90 per cent benzol. There may be present about 10 per cent toluol and 3 to 5 per cent xylol and related substances. The quantity of sulphur is usually the most objectionable substance, and this may be present to the extent of about 2 per cent, but effort is always made to keep the quantity of sulphur down.

Pure benzol has a fixed boiling point, 80.2 degrees Centigrade, or 176 degrees Fahrenheit, and consequently the distillation of the pure substance may be represented by a straight line. The 90 per cent benzol will usually approximate the following:

Initial	165 F.
Five per cent	176
Fifty	190
Ninety	212
Final	330

The lighter portions of the distillate are usually the richer in sulphur, so 5 per cent at 176 may be looked upon as a maximum, and the smaller the quantity of the more volatile portion, the better will the benzol be for motor fuel purposes.

Pure benzol has a specific gravity between 0.875 and 0.884, so the lower figure would then be equivalent to 7.3 pounds to the gallon.

The freezing point of benzol is quite high, 39.2 degrees Fahrenheit.

The color of the pure product is similar to that of pure water, but the commercial grades may vary through a very light yellow to deep straw color and even brown.

Relative purity may be demonstrated by means of the distillation test and if the final boiling point is much higher than that given above, the material should not be used for blending with gasoline for use as motor fuel.

SIZE OF BARREL OF OIL AND EQUIVALENT UNITS

How many gallons are there in 1 bbl. of oil? How many cubic feet are there in 1 bbl.? What are these in cc. and pounds?—T. G.

The standard barrel for the measurement of crude oil in the United States is 42 gallons. There is a tendency toward 50 gallons to the barrel and this unit is employed for gasoline and lubricating oils; however, the 50-gallon barrel is commonly called a drum. There are drums of other sizes so it is advisable to use the full description when this size is intended as "50-gallon drum."

The barrel of 42 gallons is equivalent to 5.6145 cubic feet, about.

There are 3.785.4162 cc. in a gallon, or 158,987.4804 cc. in 1 bbl.

The weight in pounds varies with the gravity of the oil.

NORTH AND WEST TEXAS

(Continued from Page 62)

south and 1,980 feet east of NW cor. Section 24, Block 194. Kirby Petroleum Co.'s No. 1 W. W. Turney is 200 feet south and east of NW cor. SW Section 11, Block 140, T. & St. L. R.R. Survey.

In all, there were 16 new locations reported in West Texas during the past week, and just 15 completions.

West Texas Increase

West Texas production jumped 10,284 bbls. last week due to increases in the Church-Fields Pool of Crane County, which accounted for 5,000 bbls. of the increase, Upton County, which scored a 2,500-bbl. gain and Winkler County, which climbed about 2,300 bbls. Pecos County runs were also a little higher than the previous week, amounting to 6,151 bbls. Winkler was up above 9,000 bbls.

The chief development of the week in Winkler County was the opening of Murchison Oil Co. and others' producer in Section 35, Block B-5, east of the Hendricks Pool, which was reported last week as having flowed 195 bbls. an hour. The American Pipe Line Co. connected to this well and it was opened at 3 p. m., September 17, flowing 1,500 bbls. in 16 hours and continuing at the rate of 90 bbls. an hour.

From the looks of things this well has probably opened up a drilling campaign that may be hard to stop. New locations include two by Murchison and others on the same tract, four by Marland Oil Co. on the 40 acres to the south, and one more by the Pure Oil Co., offsetting Marland. Murchison Oil Co. and others' No. 3 Grisham-Hunter is in the NE cor. NW SW Section 35, Block B-5; No. 4 is SE cor. same 40 acres. Marland Oil Co.'s No. 1 Grisham-Hunter is in the NW cor. SW SW, same section; No. 2 is SW cor., No. 3 NE cor., and No. 4 SE cor. of the SW SW, Section 35. Murchison Oil Co. and Cranfill Brothers have made a location which will call for one or two more offsets by the Southern Crude. It is labeled No. 1 Grisham-Hunter-B, 1,320 feet from the south line and 1,650 feet from the west line of Section 35, Block B-5, a south offset to Southern Crude's No. 1 T-89 Hendricks-A.

Southern Crude's No. 3 T-68 Hendricks-A, SW cor. W half NW, Section 35, Block B-5, topped the lime at 2,308 feet and was cementing the 6-inch Monday at total depth of 2,313 feet. Republic Production Co.'s No. 1 Grisham-Hunter-B in Section 41 topped the salt at 1,300 feet and was drilling at 1,475 feet.

Church-Fields Pool

Two wells good for 30 bbls. hourly were contributed to the Church-Fields-McElroy Pool during the week by the Gulf Production Co. Their No. 38 J. T. McElroy in the NE cor. of Section 200, south offset to Landreth's No. 15 Cowden-Anderson, came in for 577 bbls. after a 200-quart shot at 2,869-2,948 feet. The crude tested 33 degrees gravity. No. 37 J. T. McElroy flowed 625 bbls. in 24 hours at 2,852 feet, natural, and increased to 30 bbls. an hour at 2,875 feet. Nos. 39, 40, 41 and 42 are the only remaining tests drilling on the Gulf's J. T. McElroy property.

Landreth Production Corp.'s No. 16 Cowden-Anderson, north offset to Gulf's No. 42 J. T. McElroy, which is located in the NW cor. of Section 185, set and cemented the 6-inch at 2,773 feet and started drilling the plug Sunday. It topped the brown lime at 2,758 feet.

In Runnels County, L. D. Ladd and others' No. 1 R. M. McMillan, in the Domingo Diaz Survey, was runing 5-inch casing with one joint perforated on the bottom and packer above. Top of the pay and total depth is 2,545 feet. A new Runnels County location is Miles Oil Co.'s No. 1 L. S. Lawhon, NE cor. Section 68, T. & N. O. Survey. It is drilling with a National machine.

In Crockett County, World Oil Co. located No. 1 Powell 2,325 feet south and 835 feet west of NE cor. Section 52, Block BB, G. C. & S. F. Survey.

In Upton County, Humble Oil & Refining Co. located No. 7 Ricker 2,550 feet south and 50 degrees east of No. 5 in the Mary S. Denton Survey.

In Hudspeth County, Lockhart & Co.'s No. 1 Moore is located in the center of SE Section 16, Block 71, T. & P. Survey T-6.

Howard County Showing

A showing of oil was encountered during the week in George A. Henshaw and others' No. 1 Settles, located northwest of the Texon & Marland's No. 1 Settles. Location is 1,650 feet from the north and 2,310 feet from the east lines of Section 6, Block 32, T. & P. Survey, T-2-S. The showing was topped at 1,720 feet and at 1,725 feet the well was allowed to stand for 12 hours, but only 1 bailer of oil was obtained. At latest report it was drilling at 1,805 feet in sandy lime with no increase.

A surprising increase in production resulted from deepening Texon & Marland's No. 2 W. R. Settles, NW cor. Section 159, Block 29, southern Howard County. It was deepened early last week from 1,284 feet to 1,296 feet and afterward swabbed 627 bbls. the first 24 hours and 437 bbls. the next day. Friday's gauge was 307 bbls., but it was off production for seven hours pulling 12-inch.

Crockett County had a good completion this week in Humble Oil & Refining Co.'s No. 3 Powell-B, Section 62, Block BB, north offset to P. H. Williams' No. 1 Powell. It made 400 bbls. at 2,582-2,603 feet.

In Eastland County, Prairie Oil & Gas Co.'s No. 2 S. H. Parsons, NW cor. Section 53, McLennan County School Land No. 384, an east offset to Gulf Production Co.'s No. 8 Parsons-A, flowed 312 bbls. initial at 1,608-16 feet.

In Archer County, Continental Oil Co.'s deep test, No. 60 S. M. Gose in Section 8, A. T. N. C. L. Survey, has finished standardizing and has resumed drilling at 3,460 feet with cable tools. The 8-inch was set and cemented at 3,455 feet. Chief interest in this well is due to the fact that it is scheduled to go 4,500 feet deep if necessary. It will be the first deep test in this area.

There are 16 deep tests under way in the South Bend Pool of Young County. Panhandle Refining Co.'s No. 7 McCluskey is two months old and still averages 5,400 bbls. daily.

In Cooke County, Roxana Petroleum Corp. purchased from Lynch, Stahl & Burress of Ardmore, Okla., all of their wildcat acreage in the northwestern part of Cooke County, comprising roughly 1,200 acres. The price paid was $72,000. Lynch, Stahl & Burress are to operate their Danglemeyer lease just north of the Muenster Pool and all shallow production is to belong to them, but all deeper oil goes to Roxana under the terms of this sale.

Ozark Pipe Line Co. (Roxana) started laying a 4-inch line from Healdton, Okla., to Bulcher. It had 6 miles laid the middle of last week and was averaging a mile a day. It already has a line from Bulcher to Muenster. This new line will tie into Ozark's main system to St. Louis.

Nelson Holding Co. of Wichita Falls took over a block of about 3,000 acres in northwestern Cooke County and is rigging up a rotary for No. 1 Midkiff, 420 feet east and 150 feet south of NE cor. of Solomon Gann Survey, A-411, located in the B. C. Johnson Survey, about 20 miles northwest of Gainesville. It is a 2,500-foot contract.

Beckner and others sold 30 acres in the NE part of the Smith Survey, northwestern Cooke County, to John Hooser of Dallas for $20,000. This includes the well in the NE cor. which had a show at 1,479-81½ feet and is now reaming to set pipe. Hooser also bought 200 acres lying between the Beckner lease and the George Pace well in eastern Montague County, paying $60 to $90 an acre.

WICHITA FALLS DISTRICT COMPLETIONS

Archer County

Perkins & Cullum's No. 5 Turbeville was dry and abandoned at 1,600 feet. W. C. Young's No. 1 Langford was a location abandoned.

Cooke County

Lynch, Stahl and others' No. 3-A Koelzer swabbed 60 bbls. at 1,629-64 feet; No. 4 made 70 bbls. initial at 1,632-60 feet; No. 5 swabbed 100 bbls. at 1,626-59 feet.

Oil Operators Trust Co.'s No. 3 Koelzer was good for 62 bbls. at 1,624-51 feet; No. 1 Stoffels produced 96 bbls. at 1,589-1,616 feet.

Richardson Brothers abandoned the location for their No. 1 Whaley. Sowell Brothers' No. 2 Schmidt swabbed 4 bbls. in 3 hours at 1,686-1,701 feet, but was not completed. Stroube & Stroube's No. 5 Koelzer-A had oil sand at 1,612-36 feet and after a shot of 60 quarts of nitro and 10 sticks of dynamite it made 60 bbls.

Jack County

Wynne & Miliette's No. 2 Brentmore, Inc., was abandoned at 315 feet.

Montague County

Bridwell & Heydrick and others' No. 2 McGaughey had sand at 1,143-51½ feet and broken sand 1,174-77 feet. It was plugged back to 1,154 feet and completed for 10 bbls.

Wise County

Winemiller Oil Corp.'s No. 1 Beall was dry and abandoned at 2,512 feet.

North Central Texas and West Texas Estimated Daily Production
Week ending September 18, 1927

Ranger district—	Production
Brown County	24,055
Callahan County	5,045
Coleman County	1,201
Comanche County	1,475
Palo Pinto County	481
Ranger	9,029
Shackelford County	5,837
Stephens County	9,062
Total Ranger district	56,225
Wichita Falls district—	
Archer County	24,788
Baylor County	90
Clay County	551
Cooke County	6,276
Jack County	854
Montague County	10,683
Throckmorton County	1,492
Wichita County	29,360
Wilbarger County	11,463
Young County	13,640
Total Wichita Falls district	99,157
Total North Central Texas	155,382
West Texas district—	
Big Lake Field	24,742
Crane County	103,872
Crockett County	1,728
Ector County	15
Glasscock County	402
Howard County	3,120
Jones County	1,538
Loving County	20
Mitchell County	3,716
Pecos County	6,151
Scurry County	45
Upton County	24,004
Winkler County	9,079
Total West Texas	178,432
Grand total North and West Texas	333,814
Increase	8,393

NORTH CENTRAL TEXAS COMPLETIONS

Brown County

Anderson & Simms' No. 1 Thomason was abandoned at 1,304 feet. Beale and others' No. 1 Thomason was also dry at 1,603 feet, and so was Cates Brothers' No. 1 Snipes at 1,560 feet.

Cranfill & Reynolds' No. 7 Smith was shot with 3 quarts at 1,314-37 feet, total depth 1,339 feet, and made a 200-bbl. well. Forest Oil Co.'s No. 2 Moore was estimated good for 50 bbls. at 1,253-58 feet, first oil at 1,256 feet.

Kone Production Co.'s No. 5 Hickman was dry and abandoned at 1,280 feet. Mitcham's No. 1 Keeler had a hole full of water at 1,530-83 feet, total depth 1,620 feet but was not completed. Moore Oil Corp.'s No. 2 Teague made 41 bbls. after a 15-quart shot at 1,247-64 feet, total depth 1,265 feet.

Phillips Petroleum Co.'s No. 2 Newsome was a 600-bbl. completion at 1,318-33 feet, total depth 1,335 feet. Rex-Pyramid Oil Co.'s No. 1 Smith had dry sand at 1,343-44 and 1,390-98 feet and was abandoned at the latter depth.

Roxana Petroleum Corp.'s No. 6 Smith made 902 bb'ls. at 1,305-27 feet; No. 7 Smith made 195 bbls. at 1,306-30 feet; No. 10 was good for 374 bbls. initial at 1,324-46 feet; No. 12 made 478 bbls. at 1,311-37 feet; and No. 13 was a 67-bbl. well at 1,329-55 feet, total depth 1,356 feet.

Schaffner's No. 5 Henson had sand at 1,255-65 feet, with first oil at 1,257 feet, and after a 20-quart shot made 12 bbls. Sinclair Oil & Gas Co.'s No. 1 Smith had oil sand 1,325-27 feet. It was drilled to 1,682 feet and plugged back to 1,341 feet and shot with 7½ quarts from 1,324-41 feet, making 7 bbls. afterward.

E. L. Smith Oil Co.'s No. 2 Smith made 500 bbls. at 1,318-39 feet; No. 3 Smith made 550 bbls. at 1,333-50 feet; and No. 4 Smith made 700 bbls. at 1,344-55 feet.

The Advance Oil Co.'s No. 2 Hart was shot with 60 quarts at 1,505-65 feet, total depth 1,595 feet, and as a result made 1,500,000 feet of gas. Golden Rod Oil Co.'s No. 1 King was a failure at 1,326 feet. Lightfoot's No. 1 Cleveland was making 3 bbls. of oil and 5 bbls. of water following a 15-quart shot at 1,650-60 feet. Wilson & Vandiver's No. 1 Eads was a duster at 1,502 feet.

Callahan County

Shadbolt & Creighton's No. 1 Berry had water sand at 1,076-1,110 feet and was abandoned at the latter depth with a hole full of water.

Coleman County

Douglas Drilling Co.'s No. 2 Weaver was dry and abandoned at 2,004 feet. The Choate Interests' No. 1 Stewart was also plugged at 1,241 feet.

Comanche County

Moore's No. 1 Lester was dry and plugged at 1,500 feet.

Eastland County

Gholson and associates' No. 1 Braxendall was plugged as a failure at 3,750 feet. It topped the Ellenberger lime at 3,690 feet. Mook Texas Oil Co.'s No. 7 Sibley was swabbing 10 bbls. after a 40-quart shot at 3,054-62 feet, total depth 3,072 feet. Panhandle Refining Co.'s No. 3 Webb made 1 bbl. initial as a result of a 10-quart shot at 1,184-92 feet.

Prairie Oil & Gas Co.'s No. 2 S. H. Parsons flowed 312 bbls. at 1,608-16 feet. States Oil Corp.'s No. 3 Sibley was swabbing 50 bbls. of oil and making 750-000 feet of gas at 3,083-3,100 feet but may be drilled deeper. Teatsworth and others' No. 3 Citizens' Water Works was dry and abandoned at 1,640 feet.

McLester Oil Corp. and others' No. 3 Thorp in the Ramsower Pool flowed 350 bbls. at 3,684-96 feet. Prairie Oil & Gas Co. abandoned the location for No. 2 Poe in the Carbon area.

Shackelford County

Harris and others' No. 1 McLemore was dry and abandoned at 750 feet.

Stephens County

The Texas Co.'s No. 45-A Parks was completed for 2,800,000 feet of gas at 1,878-79 feet.

WEST TEXAS COMPLETIONS

Crane County

Magnolia Petroleum Co.'s No. 10 O'Keefe swabbed 40 bbls. after a 130-quart shot at 2,922-62 feet. Top of pay was 2,935 feet and total depth 2,963 feet. Pecos Oil Co.'s No. 10 University swabbed 75 bbls. in 3 days after its second shot. The first shot was 510 bbls. at 2,820-3,020 feet and the second was 180 quarts at 2,860-3,000 feet. It will probably be shot again.

Simms & Atlantic's No. 7 University-C was completed for 7,240 bbls., pinched, from sand at 2,795-2,950 feet; No. 8 was completed for 4,000 bbls., pinched, from pay at 2,802-2,950 feet. Tidal Oil Co.'s No. 3 University-I was flowing 55 bbls. an hour and still fishing for tools at 2,950 feet.

Crockett County

J. K. Hughes Developing Co.'s No. 2 Powell-B was completed for 400 bbls. on the swab. Pay formation is 2,655-78 feet.

Glasscock County

Landreth Production Corp.'s No. 1 A. L. Houston had a hole full of sulphur water at 3,845-55 feet and was plugged at 3,885 feet.

Jones County

Tomberlin and others' No. 1 Clapp was dry and abandoned at 2,509 feet.

Pecos County

Red Bank Oil Co.'s No. 1 Mrs. M. A. Smith which made 360 bbls. initial at 1,581-1,624 feet, was officially completed but pinched in to 25 bbls. daily.

Stonewall County

R. F. Garland & Co.'s No. 1 J. W. Ward was dry and abandoned at 3,054 feet.

Taylor County

Morrison & Thompson's No. 1 Alice,

More Timken Tapered Roller Bearings are used in the oil fields than all other makes of anti-friction bearings combined!

And note the great equipment makers who vouch for Timkens by making them responsible for the performance, economy and long-life of every type of machinery.

MANUFACTURERS USING TIMKEN BEARINGS IN THEIR OIL FIELD EQUIPMENT

Allis-Chalmers Mfg Co
Athey Truss Wheel Co
Beaumont Iron Works
Bessemer Gas Engine Co
Bovaird Supply Co
Buffalo Forge Co
Buffalo Gasolene Motor Co
Chicago Pneumatic Tool Co
Cole Electric Co
Cotta Transmission Corp
D & B Pump & Supply Co
Dodge Manufacturing Corp
Emsco Derrick & Equipment Co
Fawcus Machine Co
Franklin Valveless Engine Co
Hercules Motors Corp
Howell Electric Motor Co
International Derrick & Equip't Co
Jones Oil Well Reamer Co
W A Jones Foundry & Machine Co
Leidecker Tool Co
Link-Belt Meese & Gottfried Co
Lucey Manufacturing Co
Lufkin Fdry & Machine Co
Marion Fdry & Machine Co
McEwen Brothers
The Medart Co
Northwestern Mfg Co
Novo Engine Co
R D Nuttall Co
Oil Country Specialties Mfg Co
Oil Well Supply Co
Petroleum Engineering Corp
Charles Phillips Tool Co
Portable Rotary Rig Co
J P Ratigan Co
Joseph Reid Gas Engine Co
Rotary Supply Co
Spang & Company
Star Drilling Machine Co
Stone Drill Corp
Titusville Iron Works Co
Trolley Supply Co
Twin Disc Clutch Co
Union Tool Co
Wilson-Snyder Mfg Co
Wise Machine Co
The Wright Machine Co
Young Engine Corporation

See Timken—Spaces 130-131—Texas Building
International Petroleum Exposition
Tulsa, September 24 to October 1

Rose was abandoned at 2,651 feet with a hole full of sulphur water. World Oil Co.'s No. 1 J. R. Griffith was also pulgged as a failure at 3,680 feet.

Upton County

Dixie Oil Co.'s No. 29 Burleson swabbed 15 bb'ls. in 12 hours while cleaning out after a shot of 150 quarts at 1,860-1,985 feet. Total depth was 2,107 feet before plugging back 6 feet. Roxana Petroleum Corp.'s No. 28 Bowen topped the pay at 2,124 feet and was drilled to 2,152 feet where it made 8 bailers of sulphur water and was plugged back to 2,146 feet. It swabbed 70 bbls.

Winkler County

McCulloch Oil Co.'s No. 1 Tobe Morton was plugged and abandoned at 3,504 feet, steel line measurement. Southern Crude Oil Purchasing Co.'s No. 1 T-88 Hendricks-B was completed for 5,316 bbls. at 2,907-12 feet. First gas was topped at 2,765 feet and the first oil at 2,785 feet.

WEST TEXAS DAILY AVERAGE PRODUCTION

Week ending September 17, 1927

Crane County

Church-Fields-McElroy Pool

Company and Lease—	Wells	Bbls.
Church et al—		
University	1	106
Church & Weekley—		
University	3	1,9?2
Church & Fields—		
Duoll-University	1	167
Eastland Oil & Collett—		
University	8	12,980
Gulf Prod. Co.—		
All leases	55	17,095
Humble O. & R. Co.—		
University	11	6,988
Independent O. & G.—		
University-A	2	881
University-B	1	1,3?7
Landreth Prod. Corp.—		
Cowden-Anderson	15	15,805
Magnolia Pet. Co.—		
University-Hardwicke	8	1,981
University-O'Keefe	10	1,201
State-Lasseter	3	170
Magnolia Pet. Co. et al—		
University	4	118
Pecos Oil Co.—		
University	10	6,040
Prairie O. & G. Co.—		
University	6	393
State-Lasseter	3	2,0.1
Simms & Atlantic—		
University-A	8	5,3?2
University-B	1	?4
University-C	8	16,2 8
University-D	6	4,2 5
University-E	1	302
Stidham & Thrasher—		
University	1	10
The Texas Company—		
University	1	240
University-Beasley	1	30
Tidal Oil Co.—		
University-B	2	78
University-C	1	29
University-E	1	78
University-F	6	5,1 1
University-G	2	439
University-H	2	43
University-I	2	1,002
Totals, Church-Fields-McElroy	184	102,7?6
Average per well		558

Miscellaneous Crane County

Gulf Prod. Co.—		
Waddell	1	25
Independent O. & G.—		
Hughes	1	6
McMan O. & G. Co.—		
Hughes	2	63
Marland Oil Co.—		
All leases	16	779
The Texas Company—		
King	9	276
Union Land-F	1	7
Total Miscellaneous	30	1,156
Grand Total Crane County	214	103,8 2
Average per well		485

Crockett County

Cromwell et al—		
Powell	3	130
Gulf Prod. Co.—		
Powell	6	415
J. K. Hughes Dev. Co.—		
Powell	5	195
Humble & Marland—		
Powell	9	249
Humble O. & R. Co.—		
Sorg	1	0
Powell-B	2	109
Republic Prod. Co.—		
Powell	2	165
Roxana Pet. Corp.—		
Powell	1	15
P. H. Williams—		
Powell	1	450
Total Crockett County	30	1,728
Average per well		57

Ector County

The Texas Company & J. S. Cosden, Inc.—		
Connell-A	1	15

Glasscock County

Texon & Marland—		
Settles	2	402

Howard County

Bristow & Merrick—		
A. J. Hooks	3	115
Comet Pet. Co.—		
H. R. Clay	2	20
Dixie Oil Co.—		
H. R. Clay	1	9
F. H. E. Oil Co.—		
John Roberts	1	60
Godley Oil Co.—		
A. J. Hooks	1	25
Gulf Prod. Co.—		
Chalk	3	11
Humble O. & R. Co.—		
Douthit	2	35
Lockhart & Co.—		
Chalk & Scott	7	105
Magnolia Pet. Co.—		
All leases	32	1,034
Marland Oil Co.—		
All leases	32	1,170
Marland & Group 1 Oil—		
Harding	1	26
Midwest Expl. Co.—		
H. R. Clay	2	35
Owens & Sloan—		
John Roberts	1	30
Pure Oil Co.—		
Otis Chalk	4	260
Reeves & Apperman—		
H. R. Clay	2	145
Tidal Oil Co.—		
Otis Chalk	2	40
Total Howard County	95	3,120
Average per well		32

Jones County

Atlantic O. P. Co.—		
Howell	1	3
Marland Oil Co.—		
Mason	3	370
Midwest Expl. Co.—		
Thornton	4	200
Phillips Pet. Co.—		
Tessee-Walling	4	300
Joe Winter	3	328
R. M. Beasley	1	73
J. C. Mason	1	161
H. B. Vestal	1	88
Stebbins Oil Co.—		
Higgs	1	15
Total Jones County	19	1,538
Average per well		81

Loving County

Lockhart & Co.—		
Allen	1	20

Mitchell County

Atlantic O. P. Co.—		
Womack	8	220
California Co.—		
All leases	95	2,650
F. J. Carey—		
E. Morrison	1	20
Eastland Oil Co.—		
All leases	9	177
Magnolia Pet. Co.—		
All leases	22	622
Tidal Oil Co.—		
Both leases	2	27
Total Mitchell County	137	3,7 6
Average per well		27

Pecos County

Allsman & Bell—		
River Bed	1	98
California Co.—		
Yates	1	867
Marland Oil Co.—		
Yates-A	1	575
McMan & Marland—		
Yates	1	542
Mid-Kansas & Transcontinental—		
Smith-Taylor	1	454
Yates-A	7	1,9?6
Yates-B	3	1,426
Yates-C	1	248
Red Bank Oil Co.—		
Smith	1	35
Texon O. & L. Co.—		
Yates	1	9
Total Pecos County	19	6,151
Average per well		3.4

Reagan County

Big Lake Oil Co.—		
University	117	18,781
Texon O. & L. Co.—		
University	79	5,961
Total Reagan County	196	24,742
Average per well		125

Scurry County

Northwest Oil Co.—		
All leases	5	45

Upton County

Amerada Pet. Corp.—		
Hughes	6	279
Atlantic O. P. Co.—		
Sherk	1	35
Bryant & Atlantic—		
Baker	2	53
Champlin O. & R. Co.—		
Lane	1	25
Dixie Oil Co.—		
Burleson	26	2,810
Hughes	10	247
Gulf Prod. Co.—		
All leases	14	3,670
Humble O. & R. Co.—		
Burleson	4	29
Ricker	6	1,391
Independent O. & G.—		
Burleson, Taylor & Wooley	26	9?7
McMan O. & G. Co.—		
Baker	2	27
Marland Oil Co.—		
All leases	80	2,642
Prairie O. & G. Co.—		
J. F. Lane	4	6?2
Allie Lane	4	2,540
Pure Oil Co.—		
Lane	1	120
Republic Prod. Co.—		
Baker	6	118
Roxana Pet. Corp.—		
Bowen	26	2,3?5
Estep	3	56
Hughes	10	283
Simms Oil Co.—		
Shirley	3	43
Snowden & McSweeney—		
Hughes	1	108
Sun Oil Co.—		
Burleson & Baker	10	246
The Texas Company—		
Burleson	4	40
King	12	476
Perry	3	1,863
Texon O. & L. Co.—		
Sherk	1	15
Tidal Oil Co.—		
Hughes	1	98
Burleson	1	10
Texas Pacific C. & O.—		
Sherk	4	135
Lane-A	10	3,060
Lane-B	1	33
Westx Oil Corp.—		
Sherk	3	122
White Eagle O. & R. Co.—		
Hughes	1	16
Total Upton County	287	24,004
Average per well		83

Winkler County

Independent O. & G.—		
Hendricks	1	25
Pure Oil Co.—		
Grisham-Hunter	1	996
Southern Crude O. P. Co.—		
Hendricks-T-67-A	1	3?2
Hendricks-T-67-C	2	723
Hendricks-T-88-A	1	981
Gulf Prod. Co.—		
Hendricks	1	726
Southern Crude O. P. Co.—		
Hendricks-T-88-B	1	5,326
Total Winkler County	8	9,079
Average per well		1,1?5
Grand Total West Texas	1,014	178,432
Average per well		176

DOZEN WELLS SEEK WOODBINE PAY IN NEW LIMESTONE COUNTY POOL

By Special Correspondent

MEXIA, Tex., Sept. 17.—The Cedar Creek Pool, southwest of the old Mexia Field and southeast of the Nigger Creek Field in Limestone County, is a very busy spot since the completion of the well of Reiter, Lewis and others on the R. P. Ward farm, Varella Survey. The well has been flowing from 450 to 550 bb'ls. of oil a day for the past week but the salt water and b.s. content is sufficient to make it necessary to treat the crude before it is acceptable to the Pure Pipe Line Co. The pipe line has run some of the oil after treatment and is looking for more of it and it is expected that within a short time it will have its fill, as there are over a dozen operations started, including the following: Cranfill & Reynolds' No. 1 Dugger, J. K. Hughes Development Co.'s No. 1 Lewis, Reiter, Lewis and others' No. 2 R. P. Ward. No. 1 E. Lewis and No. 1 J. A. Dugger; Ryeade Oil Co.'s No. 1 R. P. Ward, Transcontinental Oil Co.'s No. 1 J. A. Dugger, No. 2 Dugger, No. 1 E. W. Lewis and No. 1 Ward; Why Not 44 Oil Co.'s No. 1 J. and Anna Rhea and No. 1 E. W. Lewis.

C. W. Green and others' wildcat, No. 1 M. Deal, Garrison Survey, Limestone County, was abandoned as dry at 3,754 feet.

Ben Hunt and others' No. 1 A. K. Priddy, being drilled on Humphreys corporation acreage on a separate structure southeast of the Cedar Creek Pool and about 7½ miles south of the town of Mexia, had not been completed at last report. It was at a total depth of 2,960 feet.

The Pandem Oil Co.'s No. 1 Bassett, Walker Survey, was at 6,000 feet and drilling in hard, brown limestone. Dillon & Hammond's No. 1 Fenner, Hospkins Survey, had 8,500,000 feet of gas at 2 887 feet and was shut down at 2,931 feet.

In Navarro County the Magnolia Petroleum Co.'s No. 1 R. L. Hodges, Eatch Survey, was dry and abandoned at 2,037 feet.

In Henderson County, W. K. Cayton and others' No. 1 Hoffer, Nash Jeffreys Survey, was abandoned as dry at 3,205 feet.

OKLAHOMA FIELDS

(Continued from Page 338)

from 2,570 feet to 2,945 feet. No. 2 Inscore, SW cor. NE SE, Section 24-18-4w, is dry at 3,448 feet.

Tulsa County

Glidden Oil Corp.'s No. 1 Vannest, SW cor. NW NE, Section 34-19-13, is dry and abandoned at 1,463 feet.

Wagoner County

Cartwright & Kyle's No. 4 J. Luckey, CSL SE SW, Section 11-18-15, is drilling at 1,030 feet. W. R. Rowland and others' No. 1-A Johnson, SE cor. SW SE, Section 31-18-15, is drilling at 430 feet. A. A. Williams' No. 3 McIntosh, CNL SE NE, Section 12-18-17, is drilling at 240 feet.

A. A. Williams' No. 2 McIntosh, SW cor. NE NE, Section 12-18-17, is a dry hole at 283 feet. No. 1 Bruner, SW cor., Section 6-18-18, has been abandoned at 244 feet. Carhart and others' No. 1 Shepard, NE cor. SE, Section 17-17-15, is dry at 1 320 feet. W. O. Dickerson's No. 1 Apucka, SE cor. NE SE NW, Section 6-17-15, has a show of oil at 1,340 feet.

CALIFORNIA MARKET REPORTED WEAKENING

LOS ANGELES, Calif., Sept. 16.—There has been some weakening in the California oil market during the past week. U. S. Motor gasoline for domestic trade has eased off fractionally. The major companies in most cases are selling at around 8½ to 9 cents. There have been a few spot sales for out of state use as low as 7 cents. This price, however, does not reflect the present market.

The larger California marketing companies are taking further steps to eliminate bootleg gasoline. This policy is seen as an effort to induce the independent service station dealer to sell all gasoline from his station at the posted price. The probable result will be that service stations handling one of the better known brands marketed by the larger companies will not handle any cut rate gasoline. While stations selling bootleg gasoline will sell bootleg gasoline only. If the large refiners are able to hold to this policy and the independent refiners can prevent independent stations from cutting lower than 2 cents under the major companies, this step is expected to help steady the local retail market.

Export gasoline has strengthened fractionally, selling now at from 6¼ to 6¾ cents. This is due in part to the recent reduction in tank bottoms which cuts the carrying charge materially and also to the fact that the California companies have been quite successful at moving their gasoline and they are not so ready to sell at such a low price in order to move the smaller excess quantities which they now have on hand.

Engine distillate has also eased off in price. This is in sympathy with weaker gasoline prices. The kerosene export market weakened fractionally, current sales are being made at from 4 to 4¼ cents per gallon, with the volume of sales holding up well.

BUCKEYE PIPE REUNION

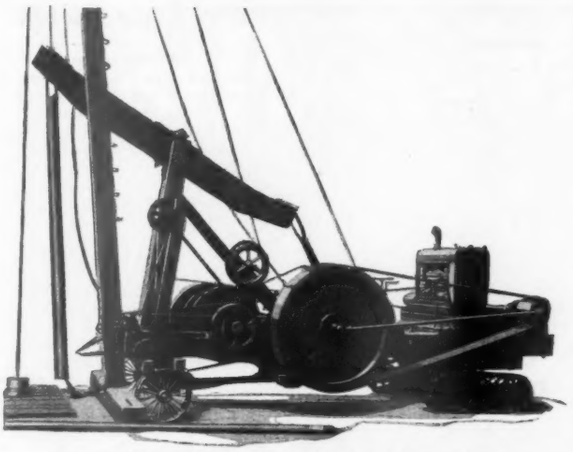
FINDLAY, Ohio, Sept. 17.—The fifth annual reunion of the retired employes of the Buckeye Pipe Line Co. was celebrated at Findlay last Saturday. Of a total membership of 70, 31 were present.

To those absent, and especially those unable to come on account of sickness, the boys sent their kindest regards. The ages of the 31 at the meeting ranged from 61 years to 84 years young, and the length of service from 25 to 47 years. Fred Klein of Oil City, Pa., was the oldest member present, being 84 years of age.

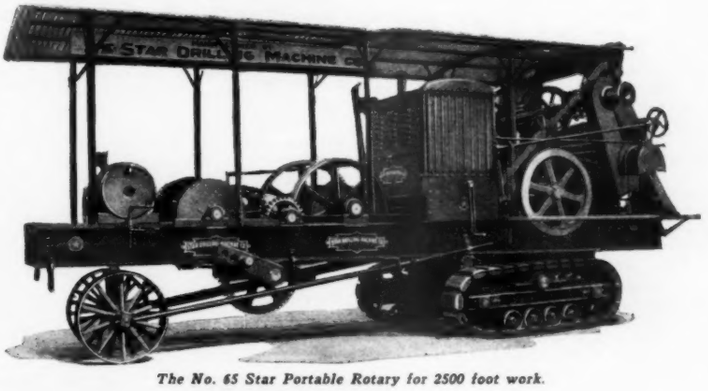
The following officers were elected: President, S. M. Fletcher; vice president, Mike Roach; secretary-treasurer, Barney T. Jacobs. The next gathering will be held at Findlay on the second Saturday of October in 1928. The retiring president, O. S. June, was given a vote of thanks. Many of the boys were disappointed that Martin Moran could not be present, as well as several others in the West.

SHALE OIL TEST

Shipment recently of two 6,000-gallon tank cars of shale oil, produced at the Governmental's experimental oil shale plant, near Rulison, Colo., to the League Island testing plant of the Navy Department, will be followed by experiments to determine the suitability of raw shale oil as fuel for naval vessels.



The Star No. 47ST Machine for 2500 foot drilling and deep cleaning-out work.



The No. 65 Star Portable Rotary for 2500 foot work.

Will Cut Your Cleaning-out Costs!

See the

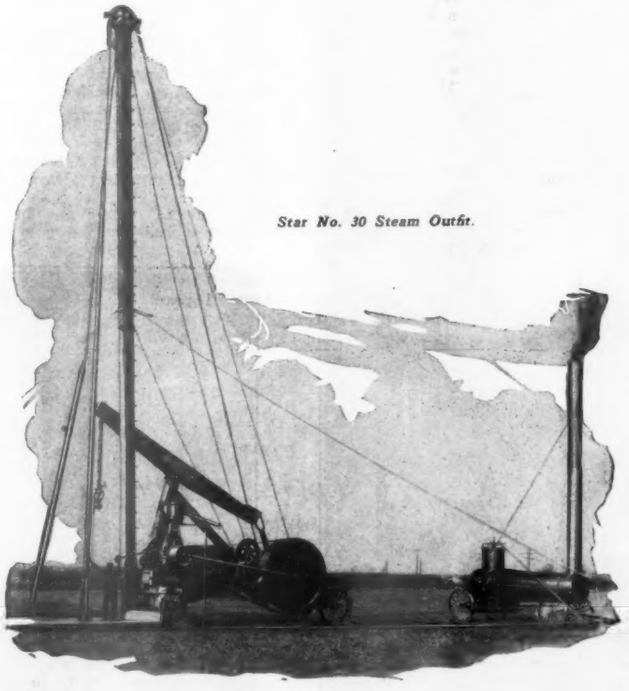
New STARS

at the

TULSA SHOW!

Or send the coupon today for complete details.

STAR makes a complete line of steam and gasoline power machines for cleaning-out and new drilling to 3000 feet.



Star No. 30 Steam Outfit.

The Star Drilling Machine Co.

Akron, Ohio

Branches at Chanute, Kans.; Wichita Falls, Texas; Long Beach, Calif.; Portland, Ore.

Export Office: 2 Rector St., New York City, U. S. A.

STAR DRILLING MACHINE CO.
Akron, Ohio

Please send us complete information and prices on a Star Drilling Machine suited for new drilling,

depth ..... , cleaning-out depth .....

.....

.....

.....

.....

Oil & Gas J.

OKLAHOMA MARKET MORE OPTIMISTIC

(Continued from Page 52)

orders carrying prices a shade under the market without having to worry about increasing stocks. Most refiners were selling U. S. Motor gasoline at 6¼ cents and not taking orders below that quotation. Most of the 6⅛-cent gasoline was for resale, only a small portion go'ng direct to the trade by Tuesday. High gravity gasolines showed an improvement as orders were received to supp'y the winter gasolines. Although it is a little early for marketers to change to the lower end-point and higher gravity gasolines for winter use, the higher natural gasoline prices were partly responsible in hastening the purchase of these grades. Much of the material will probably serve as stocks for consumption later.

Natural Gasolines

As the export and local demand for natural gasolines increased, prices were raised until Grade A was fairly scarce at 6 cents and much of it was being traded at 6¼ cents. Refiners were tak ng out more than usual in anticipation of increasing shipments of higher gravity gasolines for the coming winter season. The sales were made on the basis of supplying the material over the balance of the month and much of it represented increases in the original volume ordered by the refiners on contracts made ear y in the month. This business strengthened the prices on the B and BB grades, while a good movement of A and AA grades out of the territory accounted for the strength in these grades.

Kerosene and Distillates

Although there was no great rush of orders at any time during the week, the same firm tone which has characterized the kerosene market for the past two weeks was still apparent this week. The better quality 41-43 gravity material is moving at 4¼ cents, and some refiners are able to get one-eighth cent above that price. The 42-43 grade is showing the same firmness and is generally quoted one-fourth cent above the 41-43 grade. A part of the better position held by kerosene may be attributed to refiners decreasing their production in order to increase the production of furnace oils. The quality of the kerosene is improved by removing the heavier fractions, and the tendency is to decrease the production of the 42-43 grade. Distillates continued to be moving rather slowly. Some refiners report the r production so'd for next month on contracts, while others receive but few inquiries. This is accounted for by the wide range in quality offered, and while some refiners feel that a clean, low flash, transparent gas oil of 36 to 38 gravity meets all of the requirements of furnace oil, and are selling it at prices ranging all the way from 2⅝ to 3 cents, other refiners are supplying a treated, low flash, water-white oil of 38 to 40 gravity and demanding 3½ cents. Refiners making the better product feel that the difference in price becomes a sma'l factor, as customers demand an entirely dependable product and look for increased business as the winter approaches. One refiner pointed out, after the first cold spell, orders for the better grades increase as customers vent their complaints on odor, slow starting, or something else.

Fuel Oils and Gas Oil

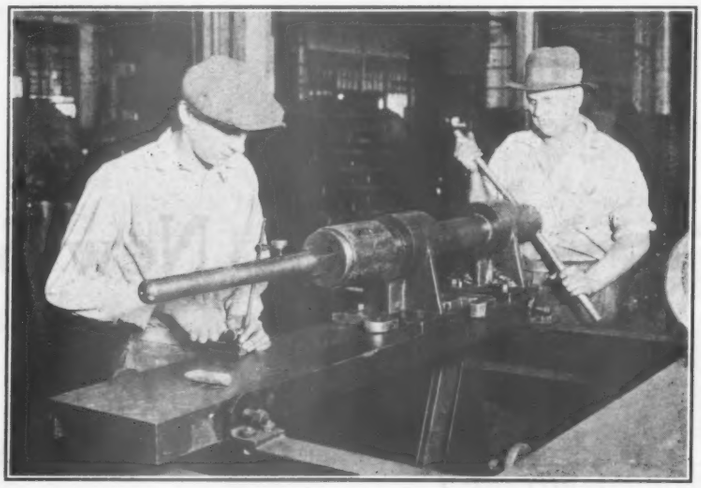
Low gravity fuel was readily available at 75 cents, and, although the movement was fair, there was no thought of higher prices for the immediate future. The coming of the heavier consuming season along with the continuation of the coal strike should place fuel in a better position, but to date this has not been realized. Gas oil showed no change in price and, except for some sold as furnace oil, inquiries were few in number. Refiners selling higher gravity fuels are utilizing their normal gas oil yield in this way and this, with the good movement of these higher gravity fuels, is furnishing a good outlet for the refiners who are not in a position to store gas oil as a cracking stock or who would be forced out on the market with their product, thus threatening the gas oil price further.

Lubricants and Wax

Refiners generally considered lubricant prices on the bottom and were relieved by the improved position in the Gulf Coast market. Movement continued only fair but steady. Cylinder stock prices remained firm with continued keen competition existing in the case of bright stocks.

With refiners holding their wax at 2⅝ cents and not pushing the business at that price, the future of the wax market looked encouraging. As the prices were forced to the low level of several months ago, new uses were developed for this product and although huge stocks of the material had been built up, this increased domestic demand has solved the problem.

TESTING A. P. I. STANDARD PIPE



Checking couplings for alignment.

Drifting A.P.I. pipe to insure free passage of next string of pipe.

Special tapping machine developed to insure the accuracy demanded in A.P.I. material.

Late Fields

(Continued from Page 62)

rado and New Mexico Coal Operators Association, announced that the association will at once initiate a measure to be submitted to a vote of the people for repeal of the ordinance fixing natural gas rates. He states that if the city council refuses to act on the contested measure mandamus proceedings in court will be instituted.

YATES POOL

FORT WORTH, Tex., Sept. 20.—Gulf Production Co.'s No. 1 Smith, Section 28, Block 194, Pecos County, has extended the Yates Pool three-quarters of a mile west. It is flowing 30 bbls. an hour at 1,312 feet. First oil was at 1,263 feet.

Three wells in the Yates Pool are now making water since Marland Oil Co.'s No. 1 Yates-A, NE cor., Section 60, Block 1, started showing 1 per cent water and 5 per cent BS this morning and pressure in this well also declined. It had been flowing through five-sixteenths choke and is now being pinched further to three-sixteenths. Yesterday's gauge was 735 barrels. This well was one of the biggest in the field initially having filled four 500-bbl. tanks in four hours about a month ago at 960-1,024 feet. Since then it has been pinched in. It is the west offset to Allsman and Bell's No. 1 River Bed which is making 4 per cent water and 1 per cent BS. Gulf Production Co.'s No. 1 Thompson, northeast offset to Allsman and Bell was shut in after making 32 per cent water while pinched to 900 bbls. daily. All three of these wells are on east edge of the pool and all are low structurally.

Gulf Production Co.'s No. 1 Palmer, Yates Pool, Pecos County, completed last week making 10,000 bbls., is showing 20 per cent sulphur water, and the Mid-Kansas Oil & Gas Co.'s No. 3 Yates is showing 9 per cent.

NATURAL GAS SUPPLY FOR PALESTINE, TEXAS

PALESTINE, Tex., Sept. 17.—Palestine is assured of natural gas connections, accord'ng to announcement made by President Chandler Beach of the Dixie Gas Co. and A. Volney Foster, president of the local gas company, who were here to close arrangements with the city of Palestine for a franchise.

The announcement said the natural gas would be delivered to the city limits of Palestine by pipe line of the Dixie Gas Co. and would be distributed by the Palestine Light, Heat & Power Co.

It was also said that comp'etion of the pipe line to deliver gas to Palestine should be made by March 1, 1928.

Checking pipe for taper.

Most Power—Widest Range of Speed

POWER is built right into the Model 70 Winch from motor to drum. This winch is manufactured especially for oil field service by the Rock Island Plow Company, Rock Island, Illinois. It has such a wide range of speed that it will operate shallow wells rapidly and economically. It has the power to operate the deepest wells. It is guaranteed to pull 10,000 pounds on a direct line. Pulls rods and tubing from drum direct over crown block—eliminates bull wheels entirely. Sixteen pulling speeds—all the way from 100 to 450 feet per minute. Speed instantly varied while in action and operator always faces the work. Any road speed from one to ten miles per hour.

Large drum, 18 inches diameter, 28-inch face, spools 140 feet of ⅞-inch line without lapping. Two extra large brakes 30 inches diameter.

Heavy duty Waukesha motor with Ricardo head; Stromberg carburetor; Splitdorf high tension magneto with impulse starter.

Cut the cost of pulling rods and tubing and of pumping wells by using Rock Island Oil Field Equipment. Ask for free book describing it.

Sold by C. F. CAMP COMPANY, *Distributors*
Corner Archer and Detroit, TULSA, OKLAHOMA

Rock Island
Model 70
Tractor Winch
Built Especially FOR
Oil Field Service

MANUFACTURED BY
ROCK ISLAND PLOW CO. *ROCK ISLAND ILLINOIS*

Brief Items for Plant Operators

THERMOPOLIS PLANT PURCHASED BY WALDEN

DENVER, Colo., Sept. 17.—The refinery constructed at Thermopolis, Wyo., several years ago by the Alliance Oil & Refining Co., known as the Singer interests, was sold for taxes recently and was acquired by J. H. Walden, of Chicago. The plant, which has been idle for some time, was rated with a charging capacity of 1,500 bbls. daily. It was constructed for the purpose of operating on crude from the Warm Springs Field, a few miles east of Thermopolis, which was acquired at the same time by the Wyoming Premier Oil Co., an affiliated concern. It has reported that the Utah Oil Refining Co. was the real purchaser of the Alliance refinery, but this is incorrect.

The Warm Springs properties, located in Sections 33 and 34-43-94, were purchased last January by C. B. Shaffer, of Chicago, under a Federal Court order for approximately $40,000. The sale was under an order of foreclosure to satisfy a morgage held by Shaffer. The properties produce less than 500 bbls. a day of black oil of 20.5 gravity. The Shaffer interests are at present moving the oil to the refinery at Thermopolis where the water is extracted. It is then shipped to the Lemont Refining Co.'s refinery at Lemont, Ill.

Mr. Walden, the new owner of the Alliance refinery, is endeavoring to work out a deal with the Shaffer interests whereby the plant will be placed in operation to skim off the gasoline from the Warm Springs crude. The principal purpose in operating the plant is to recover the residue after the gasoline is cut for use in making a substitute for ichthyol, the intentions being to ship this residue to Chicago for further treatment for the use mentioned.

SUMMARY OF METHODS IN TESTING PETROLEUM

The bound summary of A. S. T. M. methods of testing petroleum products is now available and includes the report of the D-2 committee along with those of the various subcommittees. The adopted and tentative methods are given in their entirety and include pictures of the apparatus in most cases. Several tests are described in the book which were not previously readily available. Since the A. S. T. M. designs or approves practically all test methods this booklet should be helpful in extending the use of standard methods in the industries. Some of the features of the booklet include the proposed specifications for domestic oil fuel by classes, the test methods for electrical insulating oils, and the distillation test for natural gasoline. These books contain 245 pages and may be secured from the American Society for Testing Materials at 1315 Spruce Street, Philadelphia, Pa.

INDUSTRIAL RELATIONS SESSION AT CHICAGO

CHICAGO, Sept. 20.—The ninth annual meeting and dinner of the industrial relations plan of the Standard Oil Co. of Indiana will be held Monday night, September 26, at the Congress Hotel. About 130 delegates will be present made up of an equal number of representatives of employes and the management. The morning session will be devoted to reports from the six refineries and the general office at Chicago, the afternoon session to a discussion of the relations between the employes and the management.

The annual dinner in the evening will be attended by the delegates and 60 officials and department heads from the Chicago office. C. L. Rose, electrician and employes' representative, Casper, will be toastmaster. Chairman R. W. Stewart and President E. G. Seubert will speak and responses will be made by employes' representatives from each refinery delegation and the Chicago office.

NEW DIXIE PIPE LINE FOR DIXIE OIL COMPANY

SHREVEPORT, La., Sept. 17. — The Dixie Oil Co., subsidiary of the Standard Oil Co of Indiana, has organized the Dixie Pipe Line Co. with headquarters at Shreveport and having the same officers as its parent company. F. H. Wickett is president; Mrs. N. M. Hancock, vice president, and E. J. Bullock, secretary-treasurer.

The Dixie Pipe Line Co. is being organized to operate a system of lines in North Louisiana to supply crude to the Dixie Oil Co.'s refinery at Superior, near Vivian, La., when the plant is reopened. The pipe line company has a short line in the Bellevue Field operated by the Dixie Oil Co.

The Dixie Oil Co.'s refinery at Superior has been shut down about four years since the company acquired it from the Superior Oil Co. It is a 3,000-bbl. skimming plant. The company has plans under way for overhauling it and putting it in operating condition within six months. The plant is only a short distance from the Pine Island Field, where the Dixie Oil Co. has been active in drilling for the deep Trinity horizon. The company's present production is being run by the Crystal Oil Refining Corp. of Shreveport.

The Dixie Pipe Line Co., organized by the Dixie Oil Co., a Standard Oil Co. of Louisiana subsidiary, has no relationship with the Dixie Pipe Line Co., the subsidiary of the Dixie Gas & Utilities Co., organized recently by the Moody-Seagraves interest of Houston and Galveston, Tex. The latter is a Delaware corporation domiciled in Texas.

FIRE MARSHALS NAMED

Refiners in the vicinity of Oil City, Pa., have organized a group of their men as fire marshals which will be expected to make weekly inspection trips around one of the refineries in the group and suggest any changes in the equipment or methods which would tend to decrease fire losses. The move is being sponsored by the National Petroleum Association.

SMACKOVER OIL CONTRACT

SHREVEPORT, La., Sept. 17.—The American Petroleum Co. of Texas has contracted with Henry H. Cross Co. for the delivery out of the latter's refinery at Smackover of 100 000 bbls. of gas oil to be delivered at the rate of 25,000 bbls. monthly. The American Petroleum Co. is affiliated with the Galena-Signal Oil Co., of Houston, Texas.

REFINERY REORGANIZED

CHATHAM, Ontario, Sept. 17. — The Kling-Del Refinery Co. of Wainwright, Alberta, has been reorganized with a new directorate. D. S. Gillies, of Wainwright, is president and C. Hakwans, of Provost, and D. W. Bradshaw, of Coronation have replaced C. S. Klingerman and E. Riddell on the directorate. Arrangements are being made to complete the plant to operate by January 1, 1928.

NEW W. P. R. A. MEMBERS

T. P. Eason of the Bolene Refining Co. and I. H. Patton, Jr., of the Western Oil Corp., have been elected to membership on the board of directors of the Western Petroleum Refiners Association. The newly elected members fill vacancies in the directorate arising from the recent resignations of V. E. Bolene and W. K. Campbell.

AMONG THE TECHNICAL MEN

Carl L. Johnson, chief chemist of the Manhattan Oil Co. of Kansas City, Mo., was honored at the recent meeting of the American Chemical Society held at Detroit, by being elected secretary of the petroleum division of the society. He will succeed Prof. F. W. Padgett of the University of Oklahoma.

Carl L. Johnson

The petroleum division of the American Chemical Society in recent years has become one of the strongest divisions of the national organization and in the petroleum industry it is now recognized as a leading technical group, the membership of which is constantly making important contributions to research and the practical phases of petroleum technology. Mr. Johnson's election to the position of secretary was made in recognition of his active interest in the work of the petroleum division.

Mr. Johnson was born in Kansas and received his education in the schools of that State. After graduating from Topeka High School he received the Bachelor of Science degree from Washburn College. He was awarded a fellowship in chemistry at Kansas University and later received degrees in Chemical Engineering and Master of Arts from that institution.

During the war he was at Picatinny Arsenal doing work in experimental explosives. His first work in the petroleum industry was in 1919 when he was employed as a chemist at the Sugar Creek, Mo. refinery of the Standard Oil Co. of Indiana. He served as chief chemist at the Standard plant for four years when he resigned to become technical superintendent of the Sapulpa, Okla., refinery of the Sapulpa Refining Co. Later he was employed for two years by the Pierce Oil Corp., in Mexico.

For the past two years he has held his present position with the Manhattan Oil Co. He is an officer of the Kansas City section of the American Chemical Society.

BURKBURNETT PLANT GOES TO SAN ANTONIO

SAN ANTONIO, Tex., Sept. 19.—Humble Oil & Refining Co. is moving a 5,000-bbl. refinery from Burkburnett to San Antonio and will set it up at the site of the old refinery on the Frio City Road in southern San Antonio. The refinery at Burkburnett was shut down September 1. The present refinery on the Frio City Road was purchased 11 years ago by the Humble and was operated for two years and then closed down and has not been used since. Much of the equipment is not serviceable.

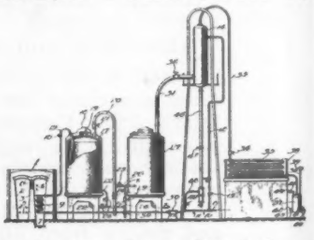
In building the refinery at San Antonio and announcing another to be built near Waco and others at points accessible to the Humble pipe lines, it is learned that Humble will attempt to serve most of its territory through refineries rather than through wholesale stations, thus effecting an economy by not having to ship in the refined product.

COTTON VALLEY PLANT

The Louisiana Oil & Refining Co. has just started operating its new absorption gasoline plant at Cotton Valley, La. The capacity has been set at 10 000 gallons daily. The exact location is described as E half of NW Section 28-21-10. Approximately $75,000 was spent for the construction work and equipment.

Recent Patents

1,638,735. Method of Hydrocarbon Oil Conversion. Lyman C. Huff, Chicago, assignor to Universal Oil Products Co., Chicago, a corporation of South Dakota. Filed November 18, 1925. Serial No. 69,736. 5 Claims. (Cl. 196—49).



1. A process for cracking hydrocarbon oil, consisting in raising the oil to a cracking temperature while flowing in a restricted stream through a heating coil positioned in a furnace, in collecting a body of the heated oil, subsequent to its passage through the heating coil, in an enlarged reaction zone, wherein conversion occurs, in separately removing the vapors evolved from the oil and unvaporized liquid oil from said reaction zone, in admitting said vapors and unvaporized liquid oil to a zone maintained under a lower pressure than said reaction zone, wherein substantial quantities of the unvaporized liquid oil is vaporized by the contained heat thereof, in removing the unvaporized oil from said zone maintained under said lower pressure without again returning the same to said zone, in subjecting the vapors evolved from the oil in said reaction zone and the vapors evolved from the unvaporized liquid oil in said zone of reduced pressure, in a commingled state, to reflux condensation, in aiding in the reflux condensation of the vapor by employing charging oil for the process as a cooling medium therefor and to also preheat the charging oil, in collecting a supply of commingled reflux condensate separated from the vapors and preheated charging oil in a zone out of contact with unvaporized liquid oil introduced to said zone of reduced pressure, and in continuously admitting oil from said supply to said heating coil.

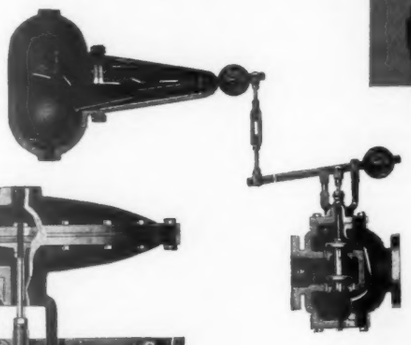
See FISHER EQUIPMENT at THE EXPOSITION

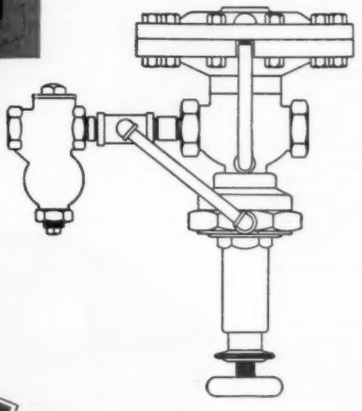
BOOTHS 102-109, TEXAS BUILDING

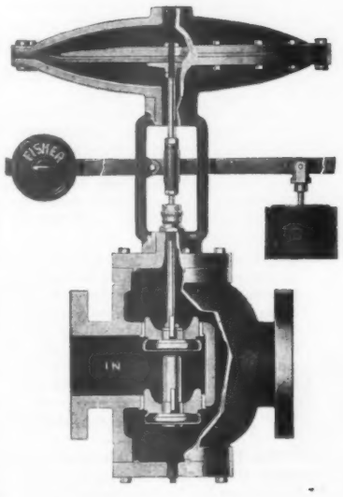
The Fisher Governor Company has been building regulating equipment for the oil, gas and steam industries for forty-seven years. During this time, it has grown out of a small frame building, that characterized the budding industry back in the eighties, to a large, modern plant covering 50,000 square feet.

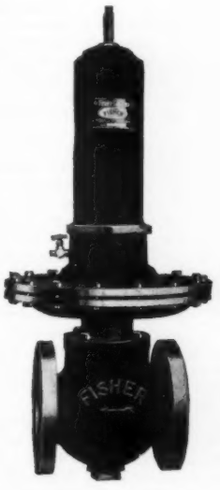
The supreme idea of the Fisher Organization has been to build products of quality. The products of our plant are the best that years of experience, the finest equipment and the skill of trained craftsmen can produce. Our patterns are made from carefully selected wood, our castings are made to exacting specifications, and every specialty is carefully tested before leaving the factory. Many articles of our regulating equipment were special jobs at first, but are now standard types, and may be seen doing faithful duty in the oil fields, at gasoline plants and refineries. We build equipment to meet any need and see that it functions to the satisfaction of the user.

We have shown here some of our standard types, including the steam trap, liquid level controller, back pressure and relief valve and vacuum regulators. These types are representative of some of the more generally used regulators, one of which may meet a particular need that you may have at the present time—or write for the complete illustrated catalog of the entire Fisher line.









FISHER
TRADE MARK
REGISTERED

1880 1927

THE FISHER GOVERNOR COMPANY

398 Fisher Building

MARSHALLTOWN, IOWA, U. S. A.

Of Interest to Sales Departments

Coal Strike May Aid Fuel Market Balance of Year

With Mid-Continent fuel oil selling at 77½ cents per barrel and being sold in other refining centers at prices as low as 60 cents per barrel the sellers are closely watching developments in the coal strike. It is expected that any advance in coal prices will result in increased demand for fuel oil.

The present overproduction of crude oil guarantees an adequate supply for many months of relatively cheap fuel oil. At the present prices of the two fuels along with the convenience and dependability of oil there is considerable to be said in favor of industries converting their equipment to the use of oil.

The coal strike has been operating through the unionized bituminous coal field for more than five months and promises to be the longest in the nation's history. The strike has differed from those of the past and has been taken less seriously because there has been no serious unsettling of the industries, no violence with no alarm felt as to the ultimate outcome.

But with the passing of summer the policy of the individual consumers regarding their fuel supply will quicken a discussion of the subject. At present the price trend for coal is upward but has taken this trend only within the past two months and statistics show a large accumulation of stocks in anticipation of the strike and a depletion of only 20 per cent at the end of the first three months.

Despite the strike, production has been maintained at a high figure. Over the year to date production has been above that of the same period for 1924 and 1925 and nearly equals the 1926 production. These former years were marked as good industrial years.

Consumers' stocks of bituminious coal on July 1 amounted to 62,000,000 tons or 54 days' supply, according to the recent quarterly estimates of the Bureau of Mines. This coal is in the hands of railroads, industrial consumers, public utilities, and retail dealers. Coal for steamship fuel, on lake docks, in transit, and in the bins of householders is not included.

Although existing stocks will indicate a comfortable reserve for present requirements, the question remains whether the increased consumption will be supplied from production or from stocks. It must be borne in mind that most of the stocks are in the hands of individual consumers and will not be available to the general public.

Summarize Strike Conditions

The conditions in the strike areas has been summarized by the Natural Resources Production Department of the United States Chamber of Commerce as follows:

1. The anthracite region, strongly union, is working under an agreement made in February, 1926, which runs until August, 1930. Although production for the month of July totaled slightly over 5,000,000 tons, it would be possible to nearly double this output should conditions warrant.

2. Central Pennsylvania, the easternmost of the union bituminous fields, continued working under a temporary agreement until July 1, when work ceased and negotiations were broken off. The operators are reported as planning to start up again on an open shop basis. The drop in production has been made up by other districts, and the production of bituminous coal in Pennsylvania is being maintained at a rate of slightly over 2,000,000 tons weekly, which is about on a par with the similar period of recent years.

3. Western Pennsylvania was formerly a union district but since the strike started a number of the mines have been working on an "open shop" basis. In fact some of them adopted this policy more than a year ago.

4. Most of West Virginia has been strongly "non union" for many years and it has gradually increased production since the Jacksonville agreement went into effect. Last year due to its proximity to tidewater it was able to make considerable shipments abroad during the British coal strike and this year it has been in a position to supply much of the deficiency of the mines closed down. Its present production is nearly three million tons a week and it is reported that there is a large reserve capacity.

5. In eastern Kentucky and in Virginia the situation is somewhat the same as that of Southern West Virginia. These "non-union" fields have likewise increased their volume of production during recent years. Virginia is now producing 250,000 tons and eastern Kentucky 1,000,000 tons weekly.

6. Western Kentucky became non-union several years ago. Its present production of nearly 500,000 tons weekly is double that of last year.

7. Illinois is a strong union district and operations have practically ceased. This district which normally produces 1,000,000 tons weekly is now producing a tenth of that amount. A few operators have signed up with the union and are continuing work.

8. Indiana is also a strong union district. Some operators have signed up with the union and a few are working on an "open shop" basis. The present production of 235,000 tons weekly is about two-thirds of the normal production of recent years.

9. Ohio is a union district which has felt keenly in recent years the competition from non-union fields. A few operators are now working on an "open shop" basis. The present production of about 135,000 tons weekly is about 30 per cent of the normal production of recent years.

Short Talks on Specifications

By W. T. Ziegenhain

B. S. TEST ON FUEL OILS BY THE CENTRIFUGE METHOD

The b.s. (basic sediment) test may be more descriptively referred to as the water and sediment test and its purpose is to show the approximate percentage of water and undissolved solid matter in fuel oil. This is important because the water content represents that much loss in the oil volume and requires heat to convert it into steam at the burner tip rather than supplying energy. The solid matter may be of such a nature that it burns readily and does not affect the heating value of the oil but an excess of certain solid matter will gradually settle out in the work tanks or will clog the burners. Unless the nature of the solid particles is understood it is usually poor practice to use fuel oil containing more than 2 per cent water and sediment combined and in many cases more stringent specifications have been adopted.

Fuel oil is a residue oil in the process of refining and contains the concentrated solid particles originally in the crude oil. Cracked fuel oil contains particles of coke in greater amounts than fuel oil made direct from the crude and if this coke remains in suspension it is not objectional for it usually is very fine and will burn readily. The centrifuge method does not accurately determine the total water content of the oil because a portion of the water remains in the oil as an emulsion even after centrifuging. If the total water is to be determined, the oil sample is distilled under prescribed conditions and the procedure will be described in detail in a future issue of The Oil and Gas Journal.

Method of Sampling

The method of sampling is of major importance in making b.s. tests and unless the sample is representative the test results are worthless. This is true of any test but there is more chance of taking a bad sample for this test than most others for the reason that fuel oil stratifies as the sediment and water very slowly settle out in the tank.

The centrifuge used to make these tests is made in accordance with specifications set up by the American Society for testing materials as well as the glass tubes as shown in the accompanying picture. The test procedure specifies that exactly 50 c.c. of 90 per cent benzol be measured in each of two centrifuge tubes and exactly 50 c.c. of the oil to be tested, is poured into each of these tubes. The mixture is vigorously shaken and then immersed in a bath for 10 minutes where the temperature is maintained at 100 degrees Fahrenheit. Then the tubes are placed in the centrifuge at opposite sides and whirled at a rate of 1,400 to 1,500 r.p.m. for 10 minutes.

A sharp line of division between the oil and the mixture of water and sediment and the volume of the b.s. can be readily determined from the graduations on the tube. With this value given, the percentage of b.s. in the original oil can be easily figured.

Some times benzol is not available and gasoline is substituted. This will give erroneous results and does not even supply relative results because the gasoline will not only allow the water and solid matter to separate out but will throw down wax contained in the oil. The results on the same sample of oil when using benzol and gasoline often vary 500 per cent.

GALLON PURCHASERS BEING CHARGED MORE

Service station proprietors in Wellington, New Zealand, in the future will make an extra charge to the buyer of petrol (gasoline) who purchases only one gallon at a time. The charge of the one gallon will be 2 shilings (about 48 cents) instead of the former price of 1s. 9d. (42 cents), an increase of 3 pence.

The explanation for this action is given in the following statement: "Service proprietors in the suburbs object to having to open up at night for customers who may want only half a gallon or a gallon of petrol. In addition the dealers say there is a great deal of leakage from their petrol wagons and that possibly the greatest loss is caused through giving too much to customers when a number of cars are waiting and the assistants have not time to wait for the excess in the bowser to flow back into the tank. According to some proprietors the loss suffered through this is enormous."

NEW MODEL AUTOMOBILE MAY CAUSE PRICE WAR

NEW YORK, Sept. 17.—Reports from Detroit indicate the possibility of an automobile price war when the Ford Motor Car Co. begins to distribute the new model coming out in October or November. This war will probably affect cars priced from $750 to $1,250, or within those limits.

The oil industry may witness a marked improvement in demand for gasoline and lubricating oils after the new Ford car is on the market. The extent of such increase may be measured by the extent to which Ford sales fell off because many Ford buyers awaited the new model, namely by over 40 per cent.

NEW USE FOR GASOLINE

The Baltimore & Ohio Railroad is now using several gasoline locomotives of special design in the transportation of freight. The locomotives are being used primarily for switching duty. One six-cylinder type has a 127 horsepower motor with sufficient power to pull 30 empty freight cars or 12 loaded cars.

The locomotives are operated on approximately two gallons of gasoline per hour. A total cost of 60 cents an hour is figured for the locomotive. One of the biggest advantages in switching duty is that there is no operating expense when the locomotive is idle. It is said other railroads will use the same type equipment.

Soften the Water Used in Cooling Jackets —*It's Much Safer*

A recent article in Oil Engine Power tells how a certain pipe line company eliminated all cylinder head failures by Zeolite treating the make-up water for the cooling system.

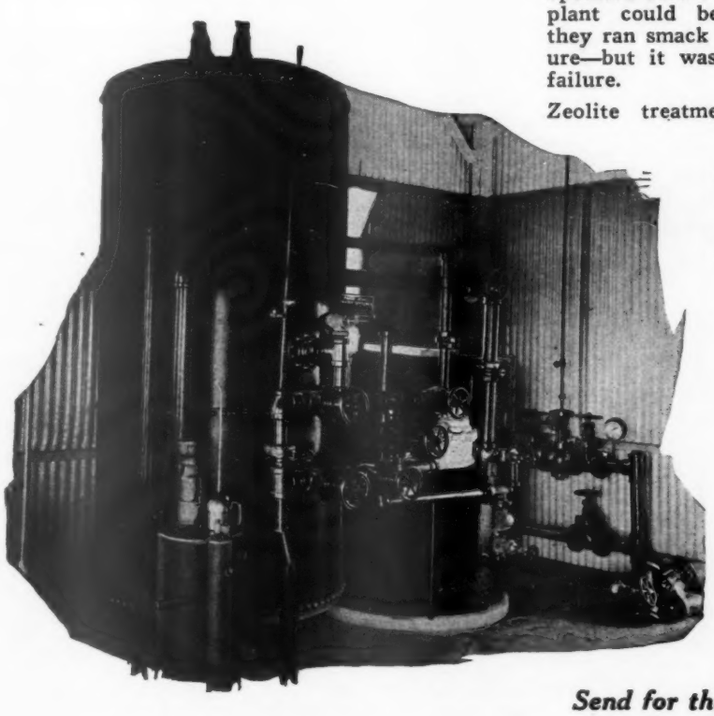
While at one of their new stations which had to be operated before its treating plant could be installed, they ran smack into a failure—but it was the *only* failure.

Zeolite treatment is the most effective way of eliminating the dangerous "scale - forming" hardness from cooling water.

The Paige - Jones Rapid Rate Upflow Zeolite System can give you this soft water protection at the lowest possible cost.

Let us tell you why in detail. Send for our new, graphically illustrated pamphlet "Softened Water —The Universal Need".

A typical Paige-Jones Installation that furnishes softened water for cooling systems. This is one of the Sinclair Oil and Refining plants.



PAIGE & JONES CHEMICAL CO., Inc.
General Sales Office, Technical Dept. and Works
HAMMOND, INDIANA
Executive Office: 461 Fourth Ave., New York
Offices in Principal Cities

Paige-Jones originated and developed this more economical zeolite system—the *rapid-rate, upflow system.*

Paige-Jones equipment comes in capacities ranging between a few gallons to many thousands. Any oil or Diesel engine installation can be served.

Be Assured of Paige-Jones Economies

Send for this bulletin →

PAIGE-JONES WATER SOFTENING

ZEOLITE AND LIME SODA SOFTENERS · PRESSURE SAND FILTERS
BOILER FEED WATER TREATMENTS · HOUSEHOLD WATER SOFTENERS

Heat of Solution of Paraffin Wax

Find Heat of Crystallization of Wax from Mid-Continent Wax Distillate to Be 72.5 B.t.u. per Pound

By F. W. Sullivan, Jr., W. J. McGill, and August French*
Standard Oil Co. of Indiana, Whiting, Ind.

In calculations concerning refrigeration requirements for the chilling of wax-bearing distillates, 63.27 B.t.u. per pound is commonly used as the heat of solution of the wax. This figure seems to have been taken from the 1894 edition of Landolt-Bornstein's "Tabellen"[1]. Graefe[2] gives a value of 70.2 B.t.u. per pound; Batelli[3], 63.0 B.t.u. per pound; Kozicki and Pilat[4], 70 B.t.u. per pound for 126 degrees Fahrenheit (52.2 degrees Centigrade) melting point paraffin wax and 78.9 B.t.u. per pound for 149.6 degrees Fahrenheit (65.3 degrees Centigrade) melting point wax.

In making heat balances for refrigerating operations on wax distillate, discrepancies have been found which it was thought might be due to the use of this commonly-accepted figure of 63.27 B.t.u. per pound. The heat of crystallization of the wax found in the wax distillate cut from Mid-Continent crude was consequently determined and found to be 72.5 B.t.u. per pound.

Apparatus

An adiabatic calorimeter was used in this work (Figure 1). The inner vessel, a, consisted of an old 1-quart, wide-mouth vacuum bottle the vacuum of which had been broken. It was left mounted in its original jacket. It was fitted with a thermometer, t, graduated in 0.2 degrees Centigrade., a heating coil, c, of No. 24 nichrome resistance wire, a one-half-inch (13-mm.) opening, o, fitted with a glass tube for introducing the wax, and t stirrer's. The stirrer was of the reciprocating type consisting of two flat rings, r, mounted on two upright wires and spaced above each other 2 inches apart. These rings were of sheet copper of about 2 inches outside diameter and 1 inch inside diameter and had one-quarter-inch (6-mm.) holes drilled about one-half inch (13 mm.) apart midway between the two edges. The ends of the upright wires were sealed into narrow glass tubing with cement. The glass tubing passed through brass sleeves in the cork covering the inner vessel. The stirrer was driven by a string which passed over a pulley, p, actuated by a crank attached to a reducing gear driven by an electric motor.

This stirrer mixed the contents of the calorimeter very thoroughly. The amount of heat developed thereby was negligible in these experiments. In 45 minutes of stirring at room temperature in a vacuum bottle the temperature of the oil was raised only 0.1 degree Centigrade.

The water bath was kept at a constant level by means of tube, e, attached to a suction line. The bath was adjusted to any desired temperature by running in water from the hot water line, h, or the cold water line, f.

The heating coil was operated by current from a 24-volt storage battery. The current consumed was measured by means of a voltmeter and ammeter which were read at 50-second intervals.

Materials

The oils were pressed distillate from Mid-Continent crude and a wax-free gas oil. With the latter it was possible to work close to room temperature because of its greater solvent effect for the wax.

The wax was obtained by recrystallization of a slack wax until it was practically oil free. This wax was ground in a food chopper into particles less than one-eighth inch (3 mm.) in diameter. These were formed into the shape of an easily crumbled rod by plunging a cork-borer into a pile of the wax particles several times and then ejecting the wax from the cork borer with one of the next smaller size. These rods disintegrated readily upon being introduced into the oil so that the wax dissolved completely in a short time.

Procedure

Four hundred grams of the oil were weighed out into the calorimeter. The motor driving the stirrer and started and the speed was adjusted by means of the regulator until the stirrer made 60 cycles per minute. The oil was brought to the desired temperature by means of the electric heating coil. Some of the first experiments were done at higher temperatures, but the later ones were done close to room temperature to reduce any possible errors due to radiation losses. When the desired temperature was reached the current was shut off and the stirring continued. Meanwhile the temperature of the water bath was adjusted by adding either hot or cold water until it was exactly the same as the temperature of the calorimeter proper. When no increase or decrease in the temperature of the calorimeter was observed for 5 minutes the wax was added as rapidly as possible through the tube. The temperature of the wax had been noted at this time.

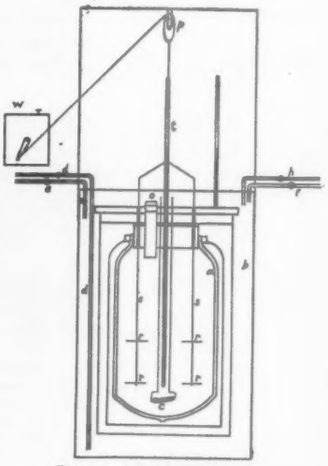


Figure 1—Adiabtic Calorimeter

Readings were taken on both the calorimeter and bath temperatures at intervals of 50 seconds. The bath temperature was adjusted so that at all times it was exactly the same as the calorimeter temperature. The air current used for stirring was sufficient to mix the water thoroughly, so that there was very little lag when it was desired to make a quick change in the temperature of the bath by the addition of cold or hot water. After sufficient experience had been gained in the operation of the apparatus, it was possible so to gauge the rate at which cold water should be added that the temperature of the bath was well within 0.2 degrees Centigrade of the calorimeter temperature.

As the wax dissolved the temperature of the contents of the calorimeter dropped. When no further drop in the temperature took place over an interval of 200 seconds the solution was considered to be at equilibrium. The calorimeter vessel was then opened immediately and the contents were examined to make sure that the wax had dissolved completely.

The heat of solution is calculated from the drop in temperature and the specific heat of the oil. Correction is made for the water equivalent of the calorimeter and the change in temperature which the wax itself undergoes.

Calculations for One Determination

Gas oil: 400 grams; specific heat, 0.386.
Wax: 20 grams; melting point, 125 degrees Fahrenheit (51.7 degrees Centigrade); specific heat, 0.6.

Temperatures

	°Cent.
Room	28.3
Oil in calorimeter:	
Initial	30.48
Final	26.95
Drop	3.53
Wax:	
Initial	28.30
Final	26.95
Drop	1.35

	Calories
Heat given up by oil: $400 \times 0.386 \times 3.53 =$	545.0
Heat given up by wax: $20 \times 0.6 \times 1.35 =$	16.2
Water equiv. of calorimeter: $58 \times 3.53 =$	204.7
Total heat absorbed when 20 grams of wax dissolved	765.9

Note—The value for the specific heat of solid paraffin wax was taken as 0.6 calorie per gram per degree. This value was obtained by averaging the few values given in the Landolt-Bornstein "Tabellen" and was considered to be close enough in these determinations, since the temperature changes in the wax involved a relatively small amount of heat.

The heat of solution is therefore $765.9 \div 20 = 38.3$ calories per gram.

Determination of Water Equivalent

Four hundred grams of water were put into the inner vessel and heated by means of the heating coil to a temperature approximating the final temperatures obtained in the heat of solution experiments. The temperature of the water bath was adjusted to that of the calorimeter and the stirring was continued until there was no change in the calorimeter temperature over a period of 200 seconds. The current in the heating coil was then turned on and a stop watch was started simultaneously. Readings of the voltage and amperage on the coil, as well as the calorimeter and bath temperatures, were taken at 50-second intervals. The bath temperature was adjusted to that of the calorimeter by running hot water into it. The heating was continued over a temperature range corresponding to the drop in temperature in the heat of solution determinations. When the desired temperature was reached the current was shut off and the stirring was continued until no further rise in temperature was observed. The voltage and amperage were averaged over the time that the current was on and the product of these averages gave the average wattage over the period.

The input in calories was calculated from the formula:

$$\frac{\text{Time in seconds} \times \text{watts}}{4.182} = \text{calories}$$

The water equivalent is $323 \div 5.48 = 58.9$ calories per degree.

Calculations for One Determination

	°Cent.
Temperature of water:	
Final	50.74
Initial	45.26
Increase	5.48

Time of heating, 450 seconds.
Average volts, 14.34
Average amperes, 1.63
Average watts, 23.37

$$\frac{450 \times 23.37}{4.182} = 2515 \text{ calories input}$$

$$400 \times 5.48 = \frac{2192}{323} \begin{matrix} \text{calories absorbed by water} \\ \text{calories absorbed by calorimeter over 5.48 degrees Centigrade range.} \end{matrix}$$

A number of determinations made in this way gave the values: 59.05, 56.31, 54.38, 61.08, 58.94; average, 57.95. The value 58 calories per degree was used as the water equivalent in all the heat of solution determinations.

Specific Heats of Oils

The specific heats of the oils used were determined in the same way that the water equivalent was determined.

Determination of Heat of Solution of 125 Degrees Fahrenheit, 51.7 Degrees C.M.P. Paraffin Wax

Expt.	Oil Pressed	Specific Heat of Oil	Temperature: Initial °C.	Temperature: Final °C.	Temperature: Room °C.	Heat of Solution: Cal./gram	Heat of Solution: B.t.u./lb.
1	Distilled	0.438	50.27	48.15	23.3	40.6	73.2
2	Distilled	0.438	51.80	47.32	26.0	39.5	71.0
3	Distilled	0.438	51.08	46.65	25.6	39.0	70.2
4	Distilled	0.438	49.79	45.16	25.6	42.2	75.9
5	Gas oil	0.386	35.30	31.10	26.1	41.6	74.9
6	Gas oil	0.386	30.48		28.3	38.3	68.9
7	Gas oil	0.386	31.28		25.0	40.7	73.2
					Average	40.3	72.5

*Presented before the Division of Petroleum Chemistry at the Seventy-third Meeting of the American Chemical Society. Reprinted from Society's publication, Industrial and Engineering Chemistry.

[1]Day, Handbook of the Petroleum Industry, Vol. II, p. 823, John Wiley & Sons, Inc., 1922.

[2]"Laboratoriumsbuch fur Braunkohlenteerindustrie."

[3]Physik. Z., 9, 671 (1908).

[4]Petroleum, 14, 12 (1918).

STANDARD TO APPEAL TRADE-MARK DECISION

CHICAGO, Sept. 17. — According to information from attorneys of the Standard Oil Co. of Indiana an appeal will be taken from the decision of the Assistant Commissioner of Patents who recently reversed the decision of the Examiner of Interferences in the patent office holding that the trade-mark "Red Hat" was not an infringement on the "Red Crown" trade-mark of the Standard company.

The Red Hat trade-mark was adopted by the Independent Oil Men of America about three years ago and is now used by hundreds of jobber members of the association throughout the United States. It is the trade-mark for the common domestic grade of gasoline sold by these companies. This gasoline is often sold in competition with the Red Crown gasoline of the Standard company.

When the Red Hat trade-mark was first adopted by the jobber association a protest was filed by the Standard Oil Co. of Indiana with the patent office. After a hearing the Examiner of Interferences sustained the contentions of the Standard and refused to allow the Red Hat trade-mark. This decision, however, was reversed by the Assistant Commissioner of Patents.

An appeal from this decision will now be taken to the Court of Appeals of the District of Columbia. It is expected that several months will elapse before the final decision is rendered by this court.

HALF GERMAN OIL FROM COAL?

Trade Commissioner William T. Daugherty of Berlin states that Generalkonsul Bruckmann, head of the A. G. fur Industrie und Technik, which last year traded its control of Bergius coal hydrogenation patents to the German Dye Trust, recently advised the company's stockholders that beginning next year the I. G. would produce enough oil from coal to meet one-half of the local demand.

Specify ETNA

WELDED STEEL TUBULAR PRODUCTS

ESTABLISHED 1828

DISTRIBUTORS:

Bovaird Supply Company
Tulsa, Okla.

Southwest Supply Company
Bartlesville, Okla.

Superior Tube Company
Tulsa, Okla.

Atlas Supply Company
Muskogee, Okla.

Hercules Supply Company
Dallas, Texas

Keystone Pipe & Supply Company
Butler, Pa.

McEwen Bros.
Wellsville, N. Y.

S. R. Bowen Company
Los Angeles, Cal.

SPANG, CHALFANT & CO., INC.

GENERAL OFFICES, UNION BANK BUILDING

PITTSBURGH, PA.

Branch Offices:

PITTSBURGH, PA. CHICAGO, ILL. NEW YORK, N. Y. ST. LOUIS, MO.

Mills:

ETNA, PA. SHARPSBURG, PA.

One sure way to cut sales costs---permanently

JOBBERS tell us that T&P Blending Bright Stocks bring them an unusually high percentage of *business that repeats automatically.*

Write, wire or telephone for samples and quotations.

No. 913 Bright Stock	
Gravity	23-25
Flash	450-460
Fire	510-520
Vis.	80-90
Cold Test	10-20
Color	7+NPA

No. 917 D Bright Stock	
Gravity	23-24
Flash	520-530
Fire	600-610
Vis.	150-160
Cold Test	10-20
Color	3/4 TR

TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS

MEMBERS COMMITTEES ON STANDARDIZATION

(Continued from Page 232)

Manufacturers' Subcommittee

T. D. Davies, National Tube Co., 1720 Frick Bldg., Pittsburgh, Pa., chairman.

Members

Charles R. Barton, Standard Seamless Tube Co., Ambridge, Pa.

John Baxter, Republic Iron & Steel Co., Youngstown, Ohio.

H. W. Bishop, Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

James E. Cunningham, Wheeling Steel Corp., Wheeling, W. Va.

C. E. Gross, A. M. Byers Co., Pittsburgh, Pa.

B. P. Hazeltine, Wheeling Steel Corp., Wheeling, W. Va.

William M. Neckerman, Youngstown Steel & Tube Co., Youngstown, Ohio.

David H. Ramsbottom, National Tube Co., 1720 Frick Bldg., Pittsburgh, Pa.

C. T. Ressler, Reading Iron Co., Reading, Pa.

John H. Sennett, Jones & Laughlin Steel Co., Woodlawn, Pa.

E. C. Sleeman, Pittsburgh Steel Products Co., Pittsburgh, Pa.

Frank Taylor, A. M. Byers Co., Pittsburgh, Pa.

A. J. Tucker, South Chester Tube Co., Chester, Pa.

Subcommittees 9 of A-1 and 1 of A-2, American Society for Testing Materials

F. N. Speller, National Tube Co., Frick Bldg., Pittsburgh, Pa., chairman.

Members

James Ashton, A. M. Byers Co., 235 Water St., Pittsburgh, Pa.

W. J. Beck, American Rolling Mill Co., Middletown, Ohio.

G. E. Doke, New York Central Railroad, 466 Lexington Ave., New York City.

E. J. Edwards, American Locomotive Co., Schenectady, N. Y.

L. B. Grindlay, Republic Iron & Steel Co., Youngstown, Ohio.

H. F. Mattern, Reading Iron Co., Reading, Pa.

Alexander Milne, Jones & Laughlin Steel Co., Woodlawn, Pa.

V. D. Moody, Moody Engineering Co., Inc., 90 West Street, New York City.

H. B. Oatley, the Superheater Co., Inc., 17 East Forty-second Street, New York City.

G. A. Reinhardt, Youngstown Sheet & Tube Co., Youngstown, Ohio.

Charles T. Ressler, Reading Iron Co., Reading, Pa.

Herbert R. Rowland, Moody Engineering Co., Inc., 90 West Street, New York City.

L. E. Sawyer, Babcock & Wilcox Tube Co., Beaver Falls, Pa.

T. G. Stitt, Pittsburgh Steel Products Co., Monessen, Pa.

F. M. Waring, Pennsylvania Railroad Co., Altoona, Pa.

A. E. White, University of Michigan, Ann Arbor, Mich.

G. H. Woodroffe, Reading Iron Co., Reading, Pa.

RIG IRONS

Members of the special committee of the American Petroleum Institute on the standardization of rig irons are:

H. J. Lockhart, Parkersburg Rig & Reel Co., Parkersburg, W. Va., national chairman.

R. F. Hill, National Supply Co., Toledo, Ohio, national vice chairman.

H. O. Attridge, Lucey Manufacturing Corp., Chattanooga, Tenn., national secretary.

Eastern District Subcommittee
(Pennsylvania, West Virginia, Ohio, Illinois and Indiana)

M. C. Schneider, Equitable Gas Co., Pittsburgh, Pa., chairman.

James Fitzgerald, Cumberland & Allegheny Gas Co., Weston, W. Va., vice chairman.

R. C. Brown, Equitable Gas Co., Pittsburgh, Pa., secretary.

Members

John Craig, contractor, Clarksburg, W. Va.

T. H. Kerr, Ohio Fuel Supply Co., Columbus, Ohio.

J. J. Klise, contractor, Wooster, Ohio.

D. B. Phillips, T. W. Phillips Gas & Oil Co., Butler, Pa.

Mid-Continent District Subcommittee
(Oklahoma and Kansas)

C. D. Watson, Carter Oil Co., Tulsa, Okla., chairman.

R. G. Strong, Empire Gas & Fuel Co., Bartlesville, Okla., secretary.

Members

C. P. Dimit, Gypsy Oil Co., Tulsa, Okla.

J. S. Freeman, Skelly Oil Co., Tulsa, Okla.

George Moody, Cosden Oil Co., Tulsa, Okla.

Texas, Louisiana and Arkansas District Subcommittee

John H. Tucker, Gulf Production Co., Houston, Tex., chairman.

G. C. Buchanan, Gulf Production Co., Houston, Tex., secretary.

Members

W. V. Bowles, The Texas Company, Houston, Tex.

Joseph Kilchenstein, Magnolia Petroleum Co., Dallas, Tex.

R. W. Lowe, Standard Oil Co., Shreveport, La.

R. W. Richmond, Humble Oil & Refining Co., Corsicana, Tex.

***California District Subcommittee**

F. F. Hill, Union Oil Co. of California, Los Angeles, Calif., chairman.

Edwin Higgins, Chamber of Mines and Oil, Los Angeles, Calif., secretary.

Members

H. H. Anderson, Shell Co. of California, Los Angeles, Calif.

Ward B. Blodget, Chanslor-Canfield Midway Oil Co., Los Angeles, Calif.

T. A. Collins, Pan-American Petroleum & Transport Co., Los Angeles, Calif.

Wallace Canfield, Standard Oil Co. of Calif., San Francisco, Calif.

T. J. Crumpton, California Petroleum Corp., Los Angeles, Calif.

E. E. Everett, Jr., Lucey Manufacturing Corp., Los Angeles, Calif.

D. S. Faulkner, Union Tool Co., Torrance, Calif.

E. W. Goeser, Emsco Derrick & Equipment Co., Los Angeles, Calif.

W. M. Keck, Superior Oil Co., Los Angeles, Calif.

Lester Keim, Oil Well Supply Co., Los Angeles, Calif.

L. J. King, Associated Oil Co., Fellows, Calif.

W. L. McLaine, General Petroleum Corp. of California, Los Angeles, Calif.

C. C. Scharpenberg, Standard Oil Co. of California, Bakersfield, Calif.

Edward Timbs, Union Tool Co., Torrance, Calif.

Rocky Mountain District Subcommittee
(Wyoming, Montana and Colorado)

H. W. Ladd, Midwest Refining Co., Casper, Wyo., chairman.

Members

E. H. Aderton, Producers & Refiners Corp., Casper, Wyo.

C. M. Daniels, National Supply Co., Casper, Wyo.

John J. Durst, Oil Well Supply Co., Casper, Wyo.

J. J. Flanagan, Continental Oil Co., Casper, Wyo.

Robert Hackley, International Supply Co., Casper, Wyo.

B. O. Hammond, Parkersburg Rig & Reel Co., Casper, Wyo.

J. R. Healey, E. T. Williams Oil Co., Casper, Wyo.

William Holland, Ohio Oil Co., Casper, Wyo.

J. W. Jordan, Sinclair Wyoming Oil Co., Casper, Wyo.

R. B. Leggett, Texas Production Co., Casper, Wyo.

R. W. Loucks, Carter Oil Co., Casper, Wyo.

R. L. Neal, Frick-Reid Supply Co., Casper, Wyo.

W. R. Shepherd, Continental Supply Co., Casper, Wyo.

M. E. Young, New York Oil Co., Casper, Wyo.

*This committee acts on all matters pertaining to rig irons and rotary drilling equipment in the Pacific Coast district, representing the main standardization committee of the Chamber of Mines and Oil, under the chairmanship of C. C. Scharpenberg.

The FOUNDATION

Of a great skyscraper is the most important unit of construction, just as the absorbent is the most important part of any absorption gasoline plant.

CHARCOAL

the foundation, of the CHARCOAL PROCESS OF GASOLINE RECOVERY is universally recognized as the best absorbent for natural gasoline.

Specify the process with the best foundation!

GASOLINE RECOVERY CORPORATION

Charleston, W. Va.

TULSA
423 Wright Bldg.

LONG BEACH
Box 321

For Rotary Drilling Rigs

Use the highest grade of brake lining. Use GARCO Folded & Molded. It is more economical, wears longer, does a better job and is always reliable and dependable.

Tough as the asbestos from which it is made. Sturdy as the brakes it lines. Strong, effective and able to withstand heavy duty service day-in-and-day-out. Here is a *real* brake lining, built in such a way that it wears and works under the most difficult conditions. Economical because of very long life.

Write for complete information and forget brake lining troubles.

GENERAL ASBESTOS & RUBBER COMPANY
North Charleston, S. C.

Distributors

Christie-Frey Co., 417 E. Third St., Los Angeles, Calif., Southern California Distributor.

T. T. Word Supply Co., Carr & Leona Sts., Houston, Texas.

Lucey Products Corporation, Brady & Detroit Sts., Tulsa, Okla.

Lucey Products Corporation, Woolworth Bldg., New York, N. Y.

Manufacturers' Subcommittee

William Schwemlein, Parkersburg Rig & Reel Co., Parkersburg, W. Va., chairman.

Members

F. J. Bradford, Bradford Rig & Reel Co., Tulsa, Okla.

D. S. Faulkner, Union Tool Co., Torrance, Calif.

E. E. Greve, Oil Well Supply Co., Pittsburgh, Pa.

A. C. Lang, Enid Foundry & Machine Shop, Enid, Okla.

D. C. Morrow, United Iron Works, Kansas City, Mo.

T. J. Mosher, Mosher Steel & Machinery Co., Dallas, Tex.

H. E. Muchnic, Locomotive Finished Material Co., Atchison, Kans.

J. W. Sloan, Oklahoma Iron Works, Tulsa, Okla.

E. B. Smith, Marion Machine Foundry & Supply Co., Marion, Ind.

J. Q. Warren, Western Iron & Foundry Co., Wichita, Kans.

ROTARY DRILLING EQUIPMENT

Members of the special committee of the American Petroleum Institute on the standardization of rotary drilling equipment are:

Capt. J. F. Lucey, Lucey Petroleum Co., Magnolia, Bldg., Dallas, Tex., national chairman.

Ernest J. Nicklos, The Texas Company, Tulsa, Okla., national vice chairman.

R. A. Wilson, Guiberson Corp., Dallas, Tex., national secretary.

Eastern District Subcommittee

(No committee appointed, as no rotary drilling is done in this district.)

Mid-Continent District Subcommittee

(Oklahoma and Kansas)

Ernest J. Nicklos, The Texas Company, Tulsa, Okla., chairman.

F. E. Bernsen, Lucey Manufacturing Corp., Tulsa, Okla., secretary.

Members

F. M. Backon, Mohawk Drilling Co., Box 935, Ardmore, Okla.

Larry Boggs, Healdton, Okla.

J. A. Boller, Perry, Okla.

R. A. Griffith, Sinclair Oil & Gas Co., Tulsa, Okla.

Frank Hinderliter, Hinderliter Tool Co., Tulsa, Okla.

J. H. Hudson, 511 Simpson Bldg., Ardmore, Okla.

Pat Murphy, Murphy & Graham, Tonkawa, Okla.

C. M. Murray, Murray Tool & Supply Co., 218 West First Street, Tulsa, Okla.

E. F. Nolan, Carter Oil Co., Tulsa, Okla.

Arthur Olson, Noble Drilling Co., Ardmore, Okla.

S. F. Patrick, Waxahachie, Tex.

L. J. Prince, Box 387, Electra, Tex.

E. D. Shell, care of Will H. Smith, contractor, Healdton, Okla.

H. G. Texter, Standard Seamless Tube Co., Tulsa, Okla.

Hugh West, 216 East Twentieth Street, Tulsa, Okla.

Rocky Mountain District Subcommittee

(No committee appointed as very little rotary drilling is done in this district.)

Texas District Subcommittee

W. W. Fondren, Humble Oil & Refining Co., Houston, Tex., chairman.

Members

L. J. Black, Beaumont Iron Works, Beaumont, Tex.

Bert Broady, Humble Oil & Refining Co., Wichita Falls, Tex.

C. H. Brown, Continental Supply Co., Fort Worth, Tex.

T. B. Cranfill, Magnolia Building, Dallas, Tex.

Dudley Golding, Wichita Falls, Tex.

Glenn Kahle, Kirby Building, Dallas, Tex.

J. C. McCue, The Texas Company, Houston, Tex.

W. A. Moncrief, Marland Oil Co., Fort Worth, Tex.

F. G. D. Muller, General Machine Works, Houston, Tex.

W. B. Pyron, Gulf Production Co., Houston, Tex.

W. L. Todd, Simms Oil Co., Dallas, Tex.

W. C. Trout, Lufkin Foundry & Machine Co., Lufkin, Tex.

John H. Tucker, Gulf Production Co., Houston, Tex.

R. A. Wilson, Guiberson Corp., Dallas, Tex.

Louisiana and Arkansas District Subcommittee

R. E. Allison, 923-24 Slattery Building, Shreveport, La., chairman.

Members

H. A. Fitzsimons, Fitzsimons Drilling Co., Slattery Building, Shreveport, La.

D. B. Harris, Humble Oil & Refining Co., Shreveport, La.

J. R. Munce, Arkansas Natural Gas Co., Sherveport, La.

M. O. Rife, Gulf Refining Co., Shreveport, La.

H. M. Staggs, Atlantic Oil Producing Co., Shreveport, La.

M. G. Stewart, Pelican Well Tool & Supply Co., Shreveport, La.

***California District Subcommittee**

F. F. Hill, Union Oil Co. of California, Los Angeles, Calif., chairman.

Edwin Higgins, Chamber of Mines and Oil, Los Angeles, Calif., secretary.

Members

H. H. Anderson, Shell Co. of California, Los Angeles, Calif.

Ward B. Blodget, Chanslor-Canfield Midway Oil Co., Los Angeles, Calif.

Wallace Canfield, Standard Oil Co., San Francisco, Calif.

T. A. Collins, Pan American Petroleum & Transport Co., Los Angeles, Calif.

T. J. Crumpton, California Petroleum Corp., Los Angeles, Calif.

E. E. Everett, Jr., Lucey Mfg. Corp., Los Angeles, Calif.

D. S. Faulkner, Union Tool Co., Torrance, Calif.

E. W. Goeser, Emsco Derrick & Equipment Co., Los Angeles, Calif.

W. M. Keck, Superior Oil Co., Los Angeles, Calif.

Lester Keim, Oil Well Supply Co., Los Angeles, Calif.

L. J. King, Associated Oil Co., Fellows, Calif.

W. L. McLaine, General Petroleum Corp. of California, Los Angeles, Calif.

C. C. Scharpenberg, Standard Oil Co. of California, Bakersfield, Calif.

Edward Timbs, Union Tool Co., Torrance, Calif.

Special Subcommittee on Chains and Sprockets

C. R. Weiss, Link-Belt Co., Indianapolis, Ind., chairman.

Members

L. J. Black, Beaumont Iron Works, Beaumont, Tex.

E. E. Greve, Oil Well Supply Co., Pittsburgh, Pa.

H. M. Harris, Lucey Manufacturing Corp., Chattanooga, Tenn.

Edward Timbs, Union Tool Co., Torrance, Calif.

Special Subcommittee on Slush Pumps for Rotary Drilling

†A. B. Steen, The Texas Company, Houston, Tex., chairman.

Members

S. P. Farish, Farish, Watts, Collins and Crosby; Houston, Tex.

E. C. Kincade, Gulf Pipe Line Co., Houston, Tex.

F. F. Mellott, Humble Pipe Line Co., Houston, Tex.

John R. Suman, Humble Oil & Refining Co., Houston, Tex.

John H. Tucker, Gulf Production Co., Houston, Tex.

Manufacturers' and Engineers' Subcommittee

E. E. Greve, Oil Well Supply Co., Pittsburgh, Pa., chairman.

Members

L. J. Black, Beaumont Iron Works, Beaumont, Tex.

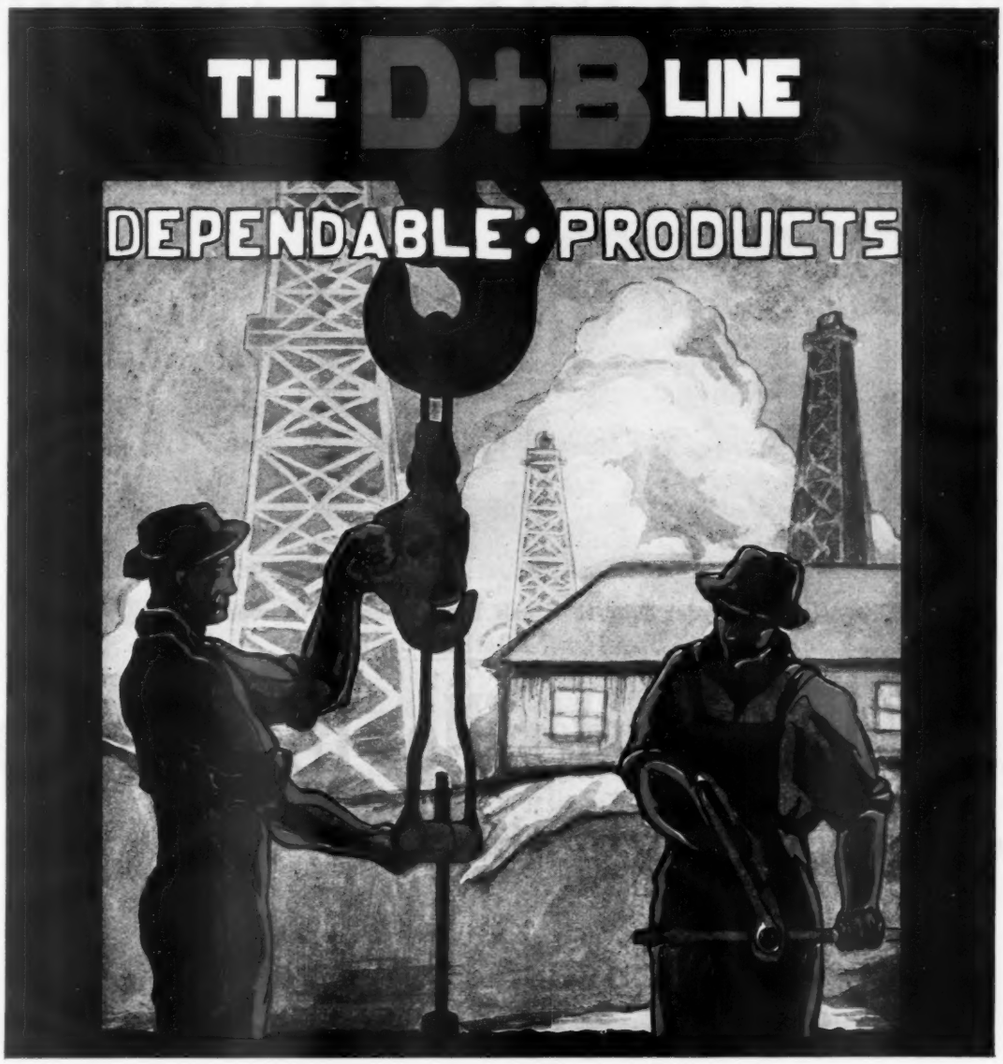
D. S. Faulkner, Union Tool Co., Torrance, Calif.

H. W. Fletcher, Hughes Tool Co., Houston, Tex.

E. W. Goeser, Emsco Derrick & Equipment Co., Los Angeles, Calif.

†Deceased.

*This committees handles all matters relating to rig irons and rotary drilling equipment in the Pacific Coast district, representing the main standardization committee of the Chamber of Mines and Oil, Los Angeles, Calif., under the chairmanship of C. C. Scharpenberg.



Seeking always for the advancement of pumping methods and efficiency and for the reduction of pumping costs, D & B has, during the past 21 *years, developed a complete line of appliances which have set new standards of superior performance. D & B products have a world wide reputation for efficiency, reliability and economy. There is a D & B pump combination for every oil field pumping condition, and a D & B product for every affiliated operation of petroleum development. Write for the complete D & B catalog.

*D & B is now starting its twenty-second year of service to the oil industry.

D & B PUMP and SUPPLY CO.

LOS ANGELES, CALIF. DALLAS, TEXAS.

BRANCH STORES.

TORRANCE, TAFT, COALINGA, BAKERSFIELD, SIGNAL HILL, HUNTINGTON BEACH & SANTA FE SPRINGS, CALIFORNIA.

3750 ft. 26 days at Seminole!

Wilson-Snyder No. 18 Slush Pump Serial Number 5915
Size 14 x 7 x 18 Inch Stroke

This Wilson-Snyder No. 18 Slush Pump made every foot of the hole!

Wilson-Snyder High Pressure Slush Pumps make hole faster with less repair parts.

The Original Long Stroke Slush Pump

WILSON-SNYDER
BUILDERS OF HEAVY DUTY PUMPS FOR OVER FIFTY YEARS
PITTSBURGH, PA U.S.A.

Murray Tool and Supply Co., Distributors, Oklahoma and Kansas

H. M. Harris, Lucey Manufacturing Corp., Chattanooga, Tenn.
Lester Keim, Oil Well Supply Co., Los Angeles, Calif.
F. J. O'Brien, Titusville Forge Co., Titusville, Pa.
W. C. Trout, Lufkin Foundry & Machine Co., Lufkin, Tex.
E. H. Williams, Union Tool Co., Carnegie, Pa.
R. A. Wilson, Guiberson Corp., Dallas, Tex.

Joint Producers' and Manufacturers' Subcommittee

W. W. Fondren, Humble Oil & Refining Co., Houston, Tex., chairman.

Members

R. E. Allison, 923-24 Slattery Bldg., Shreveport, La.
D. S. Faulkner, Union Tool Co., Torrance, Calif.
H. W. Fletcher, Hughes Tool Co., Houston, Tex.
E. E. Greve, Oil Well Supply Co., Pittsburgh, Pa.
F. F. Hill, Union Oil Co. of California, Los Angeles, Calif.
E. J. Nicklos, The Texas Company, Tulsa, Okla.

Special Subcommittee on Gauges and Gauging Practice

H. W. Fletcher, Hughes Tool Co., Houston, Tex., chairman.

Members

E. E. Greve, Oil Well Supply Co., Pittsburgh, Pa.
H. M. Harris, Lucey Manufacturing Corp., Chattanooga, Tenn.
Spencer B. Terry, Pratt and Whitney Co., Hartford, Conn.
E. H. Williams, Union Tool Co., Carnegie, Pa.

WIRE LINES AND MANILA CORDAGE

Members of the special committee of the American Petroleum Institute on the standardization of wire lines and manila cordage are:

C. C. Scharpenberg, Standard Oil Co. of California, Bakersfield, Calif., national chairman.
H. J. Leschen, A. Leschen & Sons Rope Co., St. Louis, Mo., national vice chairman, wire rope section.
J. S. McDaniel, secretary Cordage Institute, New York City, national vice chairman, cordage section.
Donald E. Dickey, General Petroleum Corp., 2525 East Thirty-seventh Street, Los Angeles, Calif., national secretary.

Eastern District Subcommittee
(Pennsylvania, West Virginia, Ohio, Illinois and Indiana)

S. W. Meals, Carnegie Natural Gas Co., Pittsburgh, Pa., chairman.

Members

R. E. Brown, American Steel & Wire Co., Pittsburgh, Pa.
James Burtner, Burtner, Morgan & Stephens, Wooster, Ohio.
G. H. Klinger, Emlenton, Pa.
Frank LeRoy, Peoples & Hope Natural Gas Co., Pittsburgh, Pa.
J. W. McKean, Hope Natural Gas Co., Pittsburgh, Pa.

Mid-Continent District Subcommittee
(Oklahoma and Kansas)

Charles C. Brown, Kay County Gas Co., Ponca City, Okla., chairman.

Members

Clyde Alexander, Phillips Petroleum Co., Bartlesville, Okla.
J. J. Conry, Carter Oil Co., Tulsa, Okla.
J. M. Lovejoy, Amerada Petroleum Corp., Tulsa, Okla.
Claud Murray, Murray Tool & Supply Co., Tulsa, Okla.
W. I. Sidwell, Sidwell Drilling Co., Winfield, Kans.
G. A. Thompson, Empire Companies, Bartlesville, Okla.

Mid-Continent Engineering Subcommittee

K. C. Sclater, Marland Oil Co., Ponca City, Okla., chairman.

Members

H. C. O. Clarke, Pure Oil Co., Pure Oil Bldg., Chicago, Ill.
Glenver McConnell, Roxana Petroleum Corp., Tulsa, Okla.
E. J. McKee, Phillips Petroleum Co., Bartlesville, Okla.
M. G. Ensinger, Union Wire Rope Co., Tulsa, Okla.

Texas District Subcommittee

M. J. McLaughlin, Magnolia Petroleum Co., Dallas, Tex., chairman.

Members

Dave Connor, American Steel & Wire Co., Dallas, Tex.
F. S. Lane, Magnolia Petroleum Co., Dallas, Tex.
R. W. Richmond, Humble Oil & Refining Co., Corsicana, Tex.
J. H. Russell, Gulf Production Co., Houston, Tex.
John R. Suman, Humble Oil & Refining Co., Houston, Tex.
T. W. Sutherland, Lone Star Gas Co., Dallas, Tex.
M. B. Sweeney, Sun Oil Co., Dallas, Tex.

Louisiana & Arkansas District Subcommittee

M. O. Rife, Gulf Refining Co., Shreveport, La., chairman.

Members

R. E. Allison, 923 Slattery Bldg., Shreveport, La.
J. S. Hasson, Ohio Oil Co., Shreveport, La.
E. D. Holcomb, Fortuna Oil Co., Shreveport, La.
R. W. Lowe, Standard Oil Co. of Shreveport, La.

Rocky Mountain District Subcommittee
(Wyoming, Montana and Colorado)

M. J. Foley, Continental Oil Co., Casper, Wyo., chairman.
D. W. Greenburg, Midwest Refining Co., Casper, Wyo., secretary.

Members

M. T. Rathvon, Western States Oil & Land Co., Casper, Wyo.
William Holland, Ohio Oil Co., Casper, Wyo.
J. W. Jordan, Sinclair Wyoming Oil Co., Casper, Wyo.
H. W. Ladd, Midwest Refining Co., Casper, Wyo.
R. B. Leggett, Texas Production Co., Casper, Wyo.

***California District Subcommittee**

R. A. Sperry, General Petroleum Corp. of California, Los Angeles, Calif., chairman.
Edwin Higgins, Chamber of Mines and Oil, Los Angeles, Calif., secretary.

Members
(Representing Users)

H. H. Anderson, Shell Co. of California, Los Angeles, Calif.
Wallace Canfield, Pacific Oil Co., San Francisco, Calif.
T. J. Crumpton, California Petroleum Corp. of California, Los Angeles, Calif.
S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif.
J. J. Hern, Chanslor-Canfield Midway Oil Co., Los Angeles, Calif.
F. F. Hill, Union Oil Co. of California, Los Angeles, Calif.
J. O. McFaddin, Marland Oil Co., Los Angeles, Calif.
R. R. Pollok, Box 159, Maricopa, Calif.
C. C. Scharpenberg, Standard Oil Co. of California, Bakersfield, Calif.
J. B. Thompson, Petroleum Midway Co., Ltd., Los Angeles, Calif.
W. O. Todd, Todd Drilling Co., Ltd., Los Angeles, Calif.
Arthur Wickstram, United Oil Co., Los Angeles, Calif.

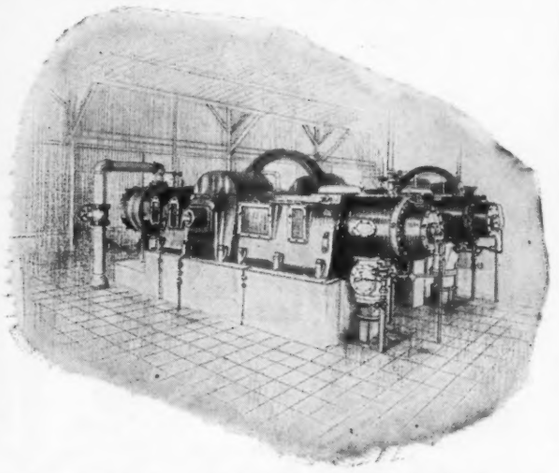
Members
(Representing Manufacturers)

E. H. Edwards, the E. H. Edwards Co., San Francisco, Calif.
E. W. Goeser, Emsco Derrick & Equipment Co., Los Angeles, Calif.
Willard G. Marks, J. A. Roeblings Sons Co., Los Angeles, Calif.
F. S. Phelps, American Steel & Wire Co., Los Angeles, Calif.
Emerson Spear, Pacific Wire Rope Co., Los Angeles, Calif.
Edward Timbs, Union Tool Co., Torrance, Calif.

*Note: This committee represents the main standardization committee of the Chamber of Mines and Oil, Los Angeles, Calif., which committee, under the chairmanship of C. C. Scharpenberg, is handling all standardization matters for the California and Pacific Coast district in co-operation with the American Petroleum Institute.

GARLOCK

STOP Wasting Oil
In Your Compressors



by applying Garlock Oil Return Wall Plate Metal Packing

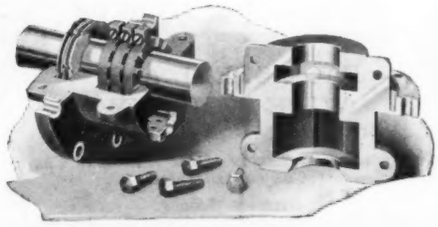
Replace the inefficient Oil Wiper Packing on your Compressor or Gas Engine Wall Plate with Garlock All Metal Oil Return Wall Plate Packing. It absolutely eliminates oil waste and is positive in action.

It will wipe every drop of oil from the compressor piston rod and return it freely to the crank case. In addition to the oil wiper feature this packing is so designed that it will take care of the vacuum and low pressure on certain types of power cylinders.

It is a known fact that the greater majority of gas and air compressors are over-lubricated and from efficiency standpoint this causes an economical and mechanical waste. Garlock Oil Return packing is one of the first devices on the market to eliminate this condition. The savings as made are listed below:

1. Greatly reduces the amount of oil consumed.
2. Eliminates oil being deposited on the discharge valves, valve chambers, pipe lines and receivers.
3. Checks oil from being discharged by the cylinder into the compressed air and gas.
4. Stops the forming of carbon deposits and oxidation.

Garlock Oil Return Packing is furnished in either split or solid case which is bolted to the partition wall plate after the stuffing box is removed. Complete mechanical details and specifications can be obtained by writing any of our Oil Field Sales Offices.



Patent Applied for

Garlock Oil Return Wall Plate Metal Packing for Gas and Air Compressors

The Garlock Packing Company
Palmyra, New York

Oil Field Warehouses and Sales Offices

Houston, Texas — Tulsa, Okla. — Los Angeles, Calif.
Pittsburgh, Penna. — Cleveland, Ohio — Denver, Colo.

The Standard Packing of the World

Asked why he preferred Page Welding Wire and Electrodes, a welding equipment expert replied "It's always right."

And in these four words he summed up the object of the painstaking methods used in Page production.

First, all raw material is analyzed to assure uniformity.

Second, all Page wire and electrodes are processed to assure perfect performance on the work for which they are recommended.

Third, every run is shop tested to make certain it stands up under actual *job* conditions.

Fourth, each piece is marked for quick identification.

You can prove this for yourself. Just ask us for samples.

PAGE STEEL AND WIRE COMPANY
Bridgeport Connecticut

An Associate Company of the American Chain Co., Incorporated

District Offices:
Chicago New York Pittsburgh San Francisco

PAGE-ARMCO PROCESSED
Welding Wire and Electrodes

Arthur Thomas, the E. H. Edwards Co., Los Angeles, Calif.

Wire Line Manufacturers' Subcommittee

H. J. Leschen, A. Leschen & Sons Rope Co., St. Louis, Mo., chairman.

Members

John K. Broderick, Broderick & Bascom Rope Co., St. Louis, Mo.

C. S. Knight, Jr., American Steel & Wire Co., Chicago, Ill.

Charles C. Sunderland, John Roeblings Sons Co., Trenton, N. J.

George S. Whyte, the MacWhyte Co., Kenosha, Wis.

Manila Cordage Manufacturers' Subcommitttee

J. S. McDaniel, secretary Cordage Institute, New York City, chairman.

Members

W. Crawford Craig, Hoover & Allison Co., Xenia, Ohio.

Edward Everett, Tubbs Cordage Co., San Francisco, Calif.

Frederick W. Hackstaff, American Manufacturing Co., Brooklyn, N. Y.

F. A. Jenks, Plymouth Cordage Co., Plymouth, Mass.

H. G. Metcalf, Columbian Rope Co., Auburn, N. Y.

J. B. Reber, Columbian Rope Co., Auburn, N. Y. (Alternate to Mr. Metcalf.)

W. W. Totten, New Bedford Cordage Co., New York City.

C. F. Wall, Wall Rope Works, New York City.

W. P. Whitlock, Jr., Whitlock Cordage Co., New York City.

United States Bureau of Mines Committee

H. L. Whittemore, United States Bureau of Standards, Washington, D. C., chairman.

Members

F. M. Brewster, United States Bureau of Mines, Bartlesville, Okla.

Rudolph Kudlich, United States Bureau of Mines, Washington, D. C.

H. W. Ladd, Midwest Refining Co., Casper, Wyo.

H. C. Miller, United States Bureau of Mines, San Francisco, Calif.

Engineering Subcommittee on Research

C. C. Scharpenberg, Standard Oil Co. of California, Bakersfield, Calif., chairman.

S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif., secretary.

Members

H. H. Anderson, Shell Co. of California, Los Angeles, Calif.

G. H. Bowlus, General Petroleum Corp. of California, Los Angeles, Calif. (Alternate for S. J. Dickey.)

Prof. R. L. Daugherty, California Institute of Technology, Pasadena, Calif.

R. L. Duff, Standard Oil Co. of New Jersey, Elizabeth, N. J.

E. H. Edwards, the E. H. Edwards Co., Los Angeles, Calif.

L. G. Gates, Standard Oil Co. of California, Bakersfield, Calif. (Alternate for Mr. Scharpenberg.)

Emerson Spear, Pacific Wire Rope Co., Los Angeles, Calif.

PUMPING EQUIPMENT AND ENGINES

Members of the special committee of the American Petroleum Institute on the standardization of pumping equipment and engines as applied to the production of oil are:

T. E. Swigart, Shell Co. of California, Los Angeles, Calif., national chairman.

John R. Suman, Humble Oil & Refining Co., Houston, Tex., national vice chairman.

P. B. Roberts, Honolulu Consolidated Oil Co., San Francisco, Calif., national secretary.

Eastern District Subcommittee
(Pennsylvania, West Virginia, Ohio, Illinois and Indiana)

A. V. Hoenig, Box 1756, Pittsburgh, Pa., chairman.

J. H. Dye, Pure Oil Co., Charleston, W. Va., vice chairman.

Members

F. H. Chapman, Ohio Oil Co., 702 St. Clair Buildinf, Steubenville, Ohio.

W. H. Cooper, The Carter Oil Co., Parkersburg, W. Va.

W. E. Livingston, South Penn Oil Co., Parkersburg, W. Va.

Mid-Continent District Subcommittee
(Oklahoma and Kansas)

Hollis P. Porter, Gypsy Oil Co., Tulsa, Okla., chairman.

Members

L. C. Camblin, Waite Phillips Petroleum Co., Tulsa, Okla.

A. S. Donnelly, The Texas Company, Tulsa, Okla.

E. F. Guidinger, Phillips Petroleum Co., Bartlesville, Okla.

H. O. Helvie, Carter Oil Co., Tulsa, Okla.

Glenver McConnell, Roxana Petroleum Corp., Tulsa, Okla.

J. R. McWilliams, Skelly Oil Co., Tulsa, Okla.

L. A. Ogden, Empire Companies, Bartlesville, Okla.

A. F. Rose, Tidal Oil Co., Tulsa, Okla.

K. C. Sclater, Marland Oil Co., Ponca City, Okla.

J. W. Shields, The Pure Oil Co., Tulsa, Okla.

John A. Wolfe, Prairie Oil & Gas Co., Tulsa, Okla.

Texas District Subcommittee

John R. Suman, Humble Oil & Refining Co., Houston, Tex., chairman.

Members

C. E. Bennett, Marland Oil Co., Fort Worth, Tex.

W. V. Bowles, The Texas Company, Houston, Tex.

Frank Gardner, Simms Oil Co., Dallas, Tex.

M. Manning, Humble Oil & Refining Co., Houston, Tex.

M. J. McLaughlin, Magnolia Petroleum Co., Dallas, Tex.

E. S. Nowery, Sun Oil Co., Beaumont, Tex.

J. H. Russell, Gulf Production Co., Houston, Tex.

B. J. Shaw, Panhandle Refining Co., Wichita Falls, Tex.

Louisiana and Arkansas District Subcommittee

Joseph B. Elam, secretary of the Arkansas and Louisiana Division, Mid-Continent Oil & Gas Association, Shreveport, La., chairman.

Members

George Belchic, Belchic & Laskey, Shreveport, La.

M. O. Rife, Gulf Refining Co., Shreveport, La.

B. W. Shankland, Standard Oil Co. of Louisiana, Shreveport, La.

L. S. Westcoat, Southwestern Gas & Electric Co., Shreveport, La.

Rocky Mountain District Subcommittee
(Wyoming, Montana and Colorado)

W. L. Connelly, Mammoth Oil Co., P. O. Box 1859, Casper, Wyo., chairman.

Members

W. R. Finney, Midwest Refining Co., Casper, Wyo.

John McFayden, Ohio Oil Co., Casper, Wyo.

Frank Redick, Ohio Oil Co., Parkerton, Wyo.

***California District Subcommittee**

W. L. McLaine, General Petroleum Corp. of California, Los Angeles, Calif., chairman.

Members

S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif.

R. R. Pollok, Box 159, Maricopa, Calif.

P. B. Roberts, Honolulu Consolidated Oil Co., Taft, Calif.

T. E. Swigart, Shell Co. of California, Los Angeles, Calif.

L. W. Voorhees, Union Oil Co. of California, Los Angeles, Calif.

Manufacturers' Subcommittee

M. T. Archer, The National Supply Co., Toledo, Ohio, chairman.

Members

F. E. Anderson, The Columbus Sucker Rod Co., Columbus, Ohio.

J. C. Axelson, Axelson Machine Co., Los Angeles, Calif.

L. P. Burgess, D. & B. Pump & Supply Co., Los Angeles, Calif.

*This committee represents the main standardization committee of the Chamber of Mines and Oil, Los Angeles, Calif., which committee, under the chairmanship of C. C. Scharpenberg, is handling all standardization matters for the California and Pacific Coast district in co-operation with the American Petroleum Institute.

Good for Another Deep Hole

This old Yellow Strand Line has already handled the casing in two holes. It stretched 24 inches while pulling 2200 feet of 6¼-inch casing. And was still in good condition after that.

Elastic-strength accounts for the remarkable vitality of Yellow Strand Rotary Drilling Line. Flexible, too; bears up under high-speed bends over sheaves and drum. Time saved is money saved. Specify Yellow Strand Rotary Drilling Line.

Write for Catalog K-2

BRODERICK & BASCOM ROPE CO.

St. Louis, Mo.

Branches: 68-70-72 Washington St., New York, and Seattle, Wash.
Factories: St. Louis and Seattle

KR351

Yellow Strand Rotary Drilling Lines

Ratigan No. 5
Shock Absorber

RATIGAN "SURE GRIP" APPLIANCES

Speed Up Production

RATIGAN'S "SURE GRIP"
GRIPS, CLAMPS
BEAM HANGERS
SUCKER ROD ELEVATORS
SAFETY HOOKS
BELL NIPPLES, ETC.

Ratigan "Sure Grip" Specialties are designed primarily to speed up production and to promote safety to life and property. These tools have been so successful in service that, almost without exception, they have been quickly adopted by the foremost operators in all fields. Whatever your conditions might be, Ratigan devices will increase the safety and efficiency of your operations. Catalog No. 50 sent on request.

J. P. Ratigan
1213 Santa Fe Avenue — Los Angeles, Calif.

Mid-Continent and Rocky Mountain Fields:
Frick-Reid Supply Company

East of the Mississippi:
All Supply Houses

California Fields:
Oil Well Supply Company
The National Supply Company
The Republic Supply Company
Associated Supply Company

Ratigan No. 14 "C" Link

If It's a "SURE GRIP" It's SURE SAFE

Anderson-Prichard Oil Corporation

PRODUCERS -- REFINERS

Oklahoma City, Oklahoma

Manufacturers of

INDUSTRIAL NAPHTHAS — COL-TEX ANTI KNOCK GASOLINES
60-62 400 End Point Gasoline — 58-60 U. S. Motor Gasoline
41-43 WW Kerosene — Gas Oils — Distillates--Fuel Oils

Independent Refiners Serving the Independent Jobbers

Refineries:

Cyril, Oklahoma — Wichita Falls, Texas — Colorado, Texas

"Satisfactory Results"

In the July 7 issue of The Oil and Gas Journal, the following advertisement appeared in the Classified Section:

"WEST TEXAS"

PECOS COUNTY—4 sec., lease 10 yr., NE part of county, $1.50 bonus, rentals 50 cents. 2 sec. W part of county, 10 yr., $1, 50 cents. One block of 10 lots, full sized, Fort Stockton. For the entire lot, $400, cash or your terms at 8 per cent.

720 A. Block 12, adjoins Humble, Roxana & Std. of Calif. about 2 miles from Pecos river and 20 N. E. Yates Field. 10 yr. lease, $7.50 with 50 cents rentals.

Brewster County. I have a number of scattered sections at $2.50 to $4 fee, unleased in the play. Will sell one or more. Also 16-640A. ranch, house, well, springs, creek; excellent hunting. $2.25 per acre. $10,000 will handle; unleased for oil. The cheapest buy in all West Texas. 200 A. fee, unleased $2.75 per acre.

Presidio County. 9,500 A. 10 yr. lease, 20 cents bonus, 10 cents rentals. 2 sections, fee, $2.50.

Terrell County. 7 sections, fee, leased for oil to expire July, 1928. $2.25 per A.

Oil operators—I have 60,000 A. solid body, NE, Brewster County, 10 yr. paid up lease, no drilling obligation. Adjoins large company holdings. Good geology. Price $1.25, will sell 15,000 A. and up.

J. S. JONES
First National Bank Bldg.,
Fort Stockton, Tex.

A few days after its appearance, Mr. J. S. Jones sent us a second classified ad and said: "I don't mind telling you that you have a great journal and that advertising results are satisfactory."

Mr. Jones' ad got results because of two factors. In the first place he chose a medium which reaches every oil man who would likely be interested in his leases and, in the second place, he made his ad comprehensive enough to interest readers in his land. Then too, he listed a wide enough variety of leases so that if one failed to interest the reader, another would. Our classified ads can assist you in selling your leases, royalties and production. Send us your ad today, describing your holdings in detail. We can obtain for you the same "satisfactory results" of which Mr. Jones speaks.

Classified Wants Department

D. R. Dale, S. M. Jones Co., Toledo, Ohio.
E. E. Greve, Oil Well Supply Co., Pittsburgh, Pa.
W. R. Guiberson, Guiberson Corp., Los Angeles, Calif.
W. H. Laury, Axelson Machine Co., Los Angeles, Calif.
John McCune, Jr., The Bessemer Gas Engine Co., Grove City, Pa.
George B. Morris, Bradford Motor Works, Bradford, Pa.
D. D. Neville, Kansas City Bolt & Nut Co., Kansas City, Mo.
John Reid, Joseph Reid Gas Engine Co., Oil City, Pa.
P. J. Shouvlin, Superior Gas Engine Co., Springfield, Ohio.
E. B. Smith, Marion Foundry & Machine Co., Marion, Ind.

Special Subcommittee on Sucker Rods

S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif., chairman.

Members

H. H. Anderson, Shell Oil Co. of California, Los Angeles, Calif.
L. P. Burgess, D. & B. Pump & Supply Co., Los Angeles, Calif.
D. R. Dale, S. M. Jones Co., Toledo, Ohio.
W. H. Laury, Axelson Machine Co., Los Angeles, Calif.
Hollis P. Porter, Gypsy Oil Co., Tulsa, Okla.

Engineers' Subcommittee

Hollis P. Porter, Gypsy Oil Co., Tulsa, Okla., chairman.

Members

George Belchic, Belchic & Laskey, Shreveport, La.
S. J. Dickey, General Petroleum Corp. of California, Los Angeles, Calif.
Frank Gardner, Simms Oil Co., Dallas, Tex.
Glenver McConnell, Roxana Petroleum Corp., Tulsa, Okla.
John R. Suman, Rio Bravo Oil Co., Houston, Tex.

STEEL TANKS FOR OIL STORAGE

Members of the special committee of the American Petroleum Institute on the standardization of steel tanks for oil storage are:

Ralph J. Reed, Union Oil Co. of California, Los Angeles, Calif., national chairman.
L. L. Langworthy, Midwest Refining Co., Casper, Wyo., national vice chairman.
Mark W. Daw, Shell Co. of California, San Francisco, Calif., national secretary.

Eastern District Subcommittee

(Pennsylvania, West Virginia, Ohio Illinois and Indiana)

L. W. Young, Jr., South Penn Oil Co., Pittsburgh, Pa., chairman.

Members

E. L. Andrews, The Buckeye Pipe Line Co., 137 West North Street, Lima, Ohio.
H. S. Austin, Tuscarora Oil Co., Ltd., 26 Broadway, New York City.
D. L. Jolly, Southwest Pipe Line Co., Washington, Pa.
Walter Samans, Atlantic Refining Co., 3144 Passyunk Avenue, Philadelphia, Pa.
A. D. Sanderson, P. O. Box 37, Standard Oil Co. of New Jersey, Elizabeth, N. J.

Mid-Continent District Subcommittee

(Oklahoma and Kansas)

H. O. Helvie, Carter Oil Co., Tulsa, Okla., chairman.
C. F. Doran, Carter Oil Co., Tulsa, Okla., secretary.

Members

John Bennett, New England Oil Co., Tulsa, Okla.
J. J. Brazil, Prairie Oil & Gas Co., Tulsa, Okla.
H. C. Davis, Gypsy Oil Co., Tulsa, Okla.
V. C. Fuller, Gypsy Oil Co., Tulsa, Okla.
G. H. Hannum, Mid-Continent Petroleum Corp., Tulsa, Okla.
J. N. Hunter, Gypsy Oil Co., Tulsa, Okla.
E. B. Marlow, Sinclair Oil Co., Tulsa, Okla.
J. A. Wolfe, Prairie Oil & Gas Co., Tulsa, Okla.

Texas District Subcommittee

E. C. Kincade, Gulf Pipe Line Co., Houston, Tex., chairman.

Members

Charles Fitzgerald, Pure Oil Pipe Line Co. of Texas, Dallas, Tex.
J. G. Glasgow, Gulf Refining Co., Port Arthur, Tex.
R. V. Hanrahan, Humble Pipe Line Co., Houston, Tex.
B. E. Hull, The Texas Pipe Line Co., Houston, Tex.

Louisiana and Arkansas District Subcommittee

E. D. Holcomb, Magnolia Petroleum Co., Shreveport, La., chairman.
(Members to be appointed)

Rocky Mountain District Subcommittee

L. L. Langworthy, Midwest Refining Co., Casper, Wyo., chairman.
D. W. Greenburg, Midwest Refining Co., Casper, Wyo., secretary.

Members

M. J. Foley, Continental Oil Co., Casper, Wyo.
R. B. Leggett, Texas Production Co., Casper, Wyo.
G. R. Miller, Carter Oil Co., Casper, Wyo.
George H. Perdunn, Illinois Pipe Line Co., Casper, Wyo.
W. H. Price, Black, Sivalls & Bryson, Casper, Wyo.
R. E. Wertz, Producers & Refiners Corp., Parco, Wyo.
Wood E. White, Sinclair Crude Oil Purchasing Co., Casper, Wyo.
M. E. Young, Central Pipe Line Co., Casper, Wyo.

***California District Subcommittee**

G. O. Wilson, Standard Oil Co. of California, San Francisco, Calif., chairman.

Members

D. W. Carswell, California Petroleum Corp., 927 Security Building, Los Angeles, Calif.
Mark W. Daw, Shell Co. of California, 200 Bush Street, San Francisco, Calif.
H. B. Haney, Associated Oil Co., 786 Pacific Electric Building, Los Angeles, Calif.
Turner C. Smith, General Petroleum Corp., Los Angeles, Calif.

Tank Manufacturers' Subcommittee

Steel storage tanks over 30,000 bbls.

H. H. Brady, American Erectors Association, 930 Union Arcade Building, Pittsburgh, Pa., chairman.

Members

H. S. Dilcher, Petroleum Iron Works Co., Kansas City, Kans.
William H. Dwyer, United Iron Works, Dallas, Tex.
Harry Denni, Kansas City Structural Steel Co., Kansas City, Mo.
P. S. Graver, Graver Corp., East Chicago, Ind.
D. E. Llewellyn, Llewellyn Iron Works, Los Angeles, Calif.
D. C. Morrow, United Iron Works, Kansas City, Mo.
H. B. Murphy, Chicago Bridge & Iron Works, Dallas, Tex.
J. M. Roberts, Riter-Conley Co., Pittsburgh, Pa.
E. E. Shanor, Petroleum Iron Works, Sharon, Pa.

Subcommittee on Small Bolted Tanks

L. N. Slater, Western Pipe & Steel Co., Los Angeles, Calif., chairman.

Members

C. R. Gallagher, C. R. Gallagher Co., 6818 Avalon Boulevard, Los Angeles, Calif.
Harry J. Haddox, Parkersburg Rig & Reel Co., Parkersburg, W. Va.
William A. Knapp, Butler Manufacturing Co., Kansas City, Mo.
Andrew A. Kramer, Columbian Steel Tank Co., Kansas City, Mo.
G. Raymond, Black-Sivalls & Bryson Manufacturing Co., Kansas City, Mo.

*This committee represents the main standardization committee of the Chamber of Mines and Oil, Los Angeles, Calif., which committee, under the chairmanship of C. C. Scharpenberg, is handling all standardization matters for the California and Pacific Coast district in co-operation with the American Petroleum Institute.

PARMACO
PARKERSBURG MACHINE CO. PARKERSBURG W. VA. U.S.A.

Stuffing Box Casing Heads

Combination

Type "CH"

Type "LW"

PARKERSBURG MACHINE CO.

PARKERSBURG, W. VA.

"The House of Courteous Service"

Proof that

Drilling Tools Designed Right Will Drill More

LEIDECKER
SPIRAL DRILLING BITS
—Patented—
on display at the Exposition
by
BOVAIRD SUPPLY COMPANY
Mid-Continent Distributors

Page 2.
Leidecker Tool Co
Bartlesville, Okla.

LOG OF SPIRAL AND PADDLE BITS ON

Leffing Well #11.
Sec. 14-31-10
Elk County, Kansas.

		Feet Drilled	
Spiral Bit...	From	0 to 64	Lime (hard)
Paddle Bit...	"	64 to 76	Light Shale
Spiral Bit...	"	76 to 128	Blue Shale & Red-bed.
Paddle Bit....	"	128 to 155	Light Shale and Lime.
Spiral Bit...	"	155 to 250	Shale, Lime and Red-bed.
Paddle Bit...	"	250 to 300	Light Shale & Sand (water)
Spiral Bit...	"	300 to 330	Blue Shale & Lime (hard)
Paddle Bit...	"	330 to 380	Lime & light Shale (hard)
Spiral Bit...	"	380 to 475	Blue Shale & Red-bed & Sand (water) & Gray Shale.

Landed 12½" Casing.

FASTER EASIER STRAIGHTER

A DRILLING record by Martin and Co. of Independence, Kansas.

Here is convincing evidence of Spiral Bit superiority. More Speed, less grief and longer life. Excelling in every test of making hole, straight hole always.

Such a demonstration of service confirms the advantages of practical design, expert workmanship and utmost value.

Mid-Continent Distributors

The Bovaird Supply Company

Stocks at Tulsa, Sapulpa, Beggs, Bristow and Seminole, Oklahoma, Independence, Kansas, and Borger, Texas

Sold by all Supply Houses

Manufactured by

The Leidecker Tool Co.

Marietta, Ohio

Branches: Casper, Wyoming, Bartlesville, Okla. Basin, Wyoming

Export Office—90 West St., New York

COMPARISON OF ALL TOWERS IN REFINING

(Continued from Page 216)

there is from deck to deck, the spacing between decks, and to some extent how nearly perfect counter current flow is obtained. The capacity of a given bubble column under various operating conditions is a complicated function of the mass velocity of the vapor and a number of other variables.

A properly designed bubble tower will accumulate considerable foreign matter on the decks before it becomes inoperative, and if made of the proper materials will withstand corrosion for long periods. A bubble tower, while fairly sensitive to control, is not as sensitive as some other types. The pressure drop through most bubble towers ranges from 0.5 pounds to 1.5 pounds, depending on the number of decks, the submergence of the caps, and the mass velocity of the vapor.

It finds wide use on shell stills, rerun stills, pipe stills, cracking plants, and somewhat restrictedly on lubricating and coke stills. The bubble tower is applicable to most any distillation problem, providing the reflux or charge does not contain much suspended solid matter, and a little back pressure is not a serious handicap.

NEW METHODS IN GASOLINE MANUFACTURE

(Continued from Page 214)

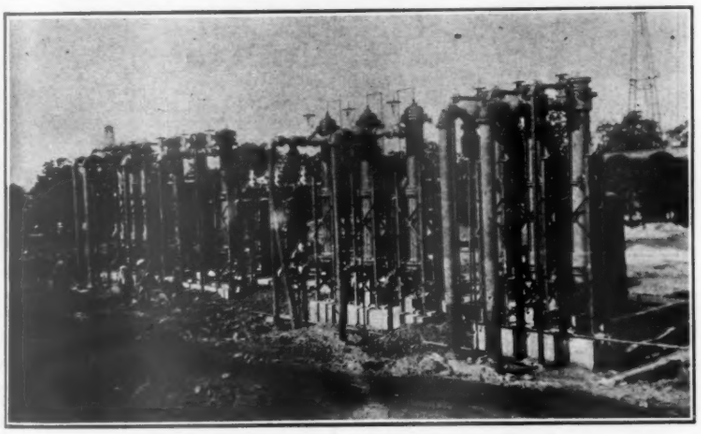
Although the gasoline recovery with this compression type plant is not quite as efficient as it would be with other methods of operation, it serves the main purpose of furnishing a large volume of residue gas for the operation of the wells. The gasoline recovered meets Grade C requirements with a volume sufficient to make the gasoline plant operation profitable. As previously stated if leases owned by other companies and also part of the gas coming from Sinclair leases. The residue gas is boosted back to the leases where it is used as fuel. Some companies have their own gas lift installations and use the gas for that purpose. In the case of the Sinclair leases two residue lines run to the leases from the plant, one being the high-pressure line from the compression plant and the other the low-pressure line from the absorption line.

Carter Oil Co.

The Carter Oil Co. has confined its operations to permanent equipment at two of its plants. These plants which have been operating for several months are of the oil absorption type similar in design to those which the company operates in the Cromwell Pool and other fields. The natural gasoline division of the company, however, also co-operates with the producing division in the operation of the gas lift.

Its operations differ from those of the Sinclair company in that no attempt is made to remove the gasoline by the compression method. The gasoline is removed from the gas by the absorption method. The dry residue gas is then returned to compressors located either at the gasoline plants or on the leases where it is compressed for the gas lift. The recycle gas is then returned to the absorption plant for the recovery of the gasoline.

The absorption method of removing the gasoline will usually result in dryer gas being returned for use in the gas lift. It should be stated in this connection, however, that due to the large quantity of gas available for the plants it is seldom possible to operate the plants with the efficiency obtainable in the settled fields. Most of the absorption units have been operated with a 100 to 300 per cent overload, the main effort of the manufacturers being to recover as much gasoline as possible from a large volume of gas and at the same time not interfere with the air or gas lift operations of the field.



High and low-stage condensers at compression plant of the Sinclair Oil and Gas Co. located in Bowlegs Pool. These condensers condense the gasoline from the gas of eighteen compressors used in gas lift operation.

needed by the production department additional compression units will be installed. Later when the wells are being pumped absorption and distillation equipment can be installed and the plant operated as a combination compression and absorption unit. Should the gas later not be available in sufficient quantities the equipment not needed can be removed to some other plant. Although the Sinclair operation provides for permanent operation the method of installation also makes possible the salvaging of any equipment not needed.

Absorption Division

The absorption division of the Bowlegs plant is operated in the conventional manner. The eight compressors take suction off the same 20-inch line header from which the other 18 units operate. All 26 units are located in the same building which as shown in the accompanying picture is 432 feet long not including the auxiliary and boiler buildings which adjoin. The total length is 640 feet.

The absorption plant is operated to take care of the gas purchased from

As long as the gas in the lift operation is being constantly recycled some manufacturers take the position that there is no advantage in securing the maximum recovery of gasoline. Operators of lift units prefer as dry gas as it is possible to obtain but the wet gas can be used. In fact in some installations, the gas is recycled through the compressors to the wells with no gasoline removed except that obtained as drip material from the high pressure lines.

Portable Equipment

In addition to two large absorption plants the Carter company is also utilizing portable equipment. The company has several portable absorption and distillation units in the field which have been used where needed. The principal use of the portable equipment has been at new wells which have a large natural flow of crude oil and casinghead gas. These units can be quickly moved to the leases when the wells are first brought in.

They have been operated on well pressure although the general practice in the

Seamless Steel Tubular Products for the Oil Country

Oil Well Tubing, 2-in., 2½-in., 3-in.
External Upset Tubing, 2-in., 2½-in., 3-in.
Line Pipe, up to 5 inches.
Refinery Piping, 1-in. to 5-in.
Bailer Tubing
Still Tubes, Upset or Plain
Tank Car Piping
Boiler Tubes
Tubular Structural Material
Special Tubing

Special attention is called to the Seamless Steel Pipe (iron pipe sizes 1-in. to 5-in.) offered by this company. The same advantages of seamless steel which have led to the widespread adoption of this material for oil well tubing, high-pressure boiler tubes and still tubes, are now available for various piping installations.

THE BABCOCK & WILCOX TUBE CO.
Works, Beaver Falls, Pa.

GENERAL SALES OFFICE:
85 Liberty St., New York, N. Y.

Branch Sales Offices:

CHICAGO
Marquette Building

DENVER
444 Seventeenth St.

NEW ORLEANS
344 Camp St.

HOUSTON
Electric Building

DALLAS
Magnolia Building

SAN ANTONIO
511 Builders Exch. Bldg.

GALVESTON
414 Security Bldg.

AMARILLO
208 Polk Street

SPECIAL OIL-WELL

STAINLESS STEEL
CHROME
MO-LYB-DEN-UM
STEEL

Strom Balls are held accurate to size to within, plus to minus .00005 and sphericity to within .000025—*therefore all Strom Balls render a like service.* You can obtain Strom Balls through your regular supply jobber—if not, write us.

We can also furnish Strom "Stainless Steel" and Strom "Chrome Mo-lyb-den-um Steel" in bars for valve seats. These steels are developed by us and are of our own special analyses—the same as used in Strom balls.

BRASS or BRONZE

Four kinds of balls for working barrel applications. Their quality is evidenced by the fact that

OVER 85%

of the balls used in the oil industry are produced by

STROM

Strom Steel Ball Co.

The largest independent and exclusive steel ball manufacturer
(Plant at Cicero, Ill.—suburb of Chicago)
360 No. Michigan Ave. Chicago, U. S. A.

Seminole Field has been to use compressor units of the portable type. The use of these portable units has resulted in production of large quantities of natural gasoline which otherwise would be wasted. The portable units are usually connected in series. As the volume of gas drops, units can be removed to some other location.

The first natural gasoline plant installation in the field was of the portable type. Its operation very clearly shows the field for portable equipment in certain field conditions. The first portable unit was installed by the Independent Oil & Gas Co. to handle the large gas output which accompanied the crude oil flow from the discovery well of the Seminole Field. The unit was in operation within a few days after it arrived at the lease. Although rated as a 5,000-gallon unit the plant has actually produced as high as 25,000 gallons daily. During the ten months it has been in operation it is estimated that the plant has averaged 500,000 gallons monthly

The operation of the plant has been tied in with the gas lift operation of the company. Compressor units have been installed. The plant now has its own boiler room with the distillation and absorption divisions protected by a galvanized iron building. Other improvements of a permanent nature have gradually been added so the plant can be operated indefinitely.

Other Types

Between the permanent installations and the strictly portable type belong a class of installations which at present probably account for the bulk of the output of the Seminole Field. This class includes oil absorption plants, compression plants and a combination of the two. It covers the operations of the Amerada Petroleum Corp., Barnsdall Oil Co., Empire Gasoline Co., Forrest E. Gilmore Co., Gypsy Oil Co., Magnolia Petroleum Co., Pure Oil Co. and the Victor Gasoline Co. A list of the plants of these companies, their capacity and other data was published in the September 8 issue of The Oil and Gas Journal (page 150).

At the plants of these companies a visitor will find practically every operating setup that it is possible to make in the manufacture of natural gasoline. Those using oil absorption for the most part have got away from the strictly portable type equipment but have not purchased the large units usually installed at permanent plants. Their equipment has a larger capacity than the portable units and at the same time it is easier to install than the large units.

These companies have deemed it advisable to scatter their plants through the fields rather than have one or two large plants. The Empire Gasoline Co., for instance, has five plants located in different parts of the Seminole area. This method of operation has worked in well with the gas lift operation, as in several cases the gas lift units are installed at the absorption plants.

The compression plants in method of operation are similar to those of the Sinclair company, although smaller. The compressors serve the double purpose of furnishing the pressure necessary to operate the wells and at the same time it is possible by condensation to remove a substantial part of the gasoline in the gas.

Barnsdall Operation

The Barnsdall Oil Co. is just starting up its first gasoline plant in the Seminole Field which is of the compression type. It consists of ten 320-horsepower engines direct connected to compressors. As now operated part of the gas from the low stage is returned to leases. The remainder is recycled through the high stage for the operation of the wells. It is the expectation of the company that eventually the plant will be operated as a combination compression and absorption plant.

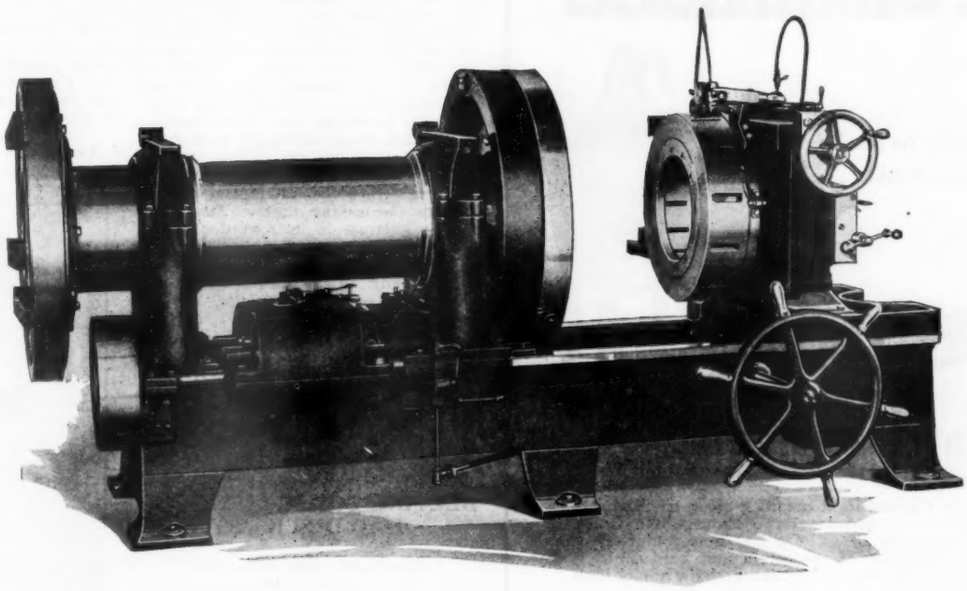
Another interesting phase of this company's operations has to do with the handling of drip gasoline. Several gas lift units are operating on leases the gas from which is under contract to the gasoline department. In the operation of these gas lift units some drip gasoline collects even when relatively dry gas is used. This is especially true during the winter months. The Barnsdall company has provided accumulator tanks at the gas lift installations with pipe line connections made to the gasoline plant where storage is provided. The gasoline is forced by gas pressure from the accumulator tanks to the storage. The Barnsdall company already has accumulated a considerable quantity of this pressure gasoline. It is expected that ultimately the gasoline obtained in this operation will be equal to the main compression operation. The rated capacity of the compression plant is 40,000 gallons daily.

General semiportable gasoline plant of the Roxana Petroleum Corp. in Bowlegs Pool.

Some of the other companies have made provision for the collection of the drip gas. Some of this gasoline has to be rerun while the remainder is blended with the product secured in the operation of the regular gasoline plants. In the operation of the compressor plants with the gas lift some of the companies have had trouble with an off color product which has to be rerun. Apparently a crude mist comes in with the gas from the wells and when condensed discolors the gasoline. This trouble has been avoided by the installation of dephlegmators or traps installed on the lines connecting the compressors and condensers.

Roxana Operation

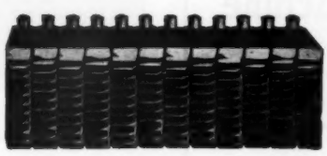
The plant of the Roxana Petroleum Corp. in the Bowlegs Pool is representative of what might be termed either "semiportable" or "semipermanent" installations. The plants of several companies belong to the same type. As is generally known the Roxana Petroleum Corp. has been a pioneer in the development of the portable or semiportable method of operation. The corporation has endeavored to perfect equipment which could be easily transported and at the same time have large enough capacity so that it could be used in permanent operations when deemed necessary. The corporation has gone further than most companies in the unit idea of construction and operation. So far as possible all equipment is in-



Extra Wide Dies . . .

Our No. 12 Duplex pipe machine, with sliding die head, shown above, is arranged for extra wide skip-tooth dies. Any Duplex machine can be furnished with these Peerless dies either 3 7-16 in. or 4 7-16 in. wide. They will cut A.P.I. or any other extra long casing thread at one pass.

The Peerless type of die, with the curved eccentric relief is the only one that can be relied upon to maintain the correct thread taper. It follows the shape of the pipe and successive grindings cannot vary the taper per inch.



Peerless Skip Tooth Dies

B. & K. machines have been standard in the oil fields for years. They are the only machines that have demonstrated their ability to stay on the job ever since oil fields commenced to use pipe threading machines. Ask any pipe man.

BIGNALL & KEELER MACHINE WORKS
of the N. O. Nelson Mfg. Co.
Edwardsville, Ill.

Tribloc Chain Hoists

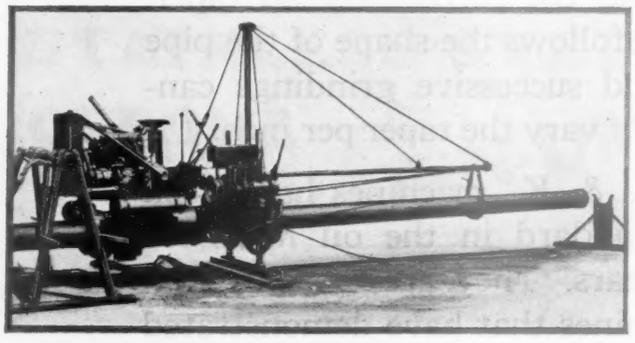
No stops ahead!

To a railroad engineer a green light means a clear track ahead. To users of chain hoists the green-colored Hand Chain Guide on Triblocs means "no stops ahead" for constant replacement of parts. Delayed movement of materials and confusion of production schedules can be reduced by using chain hoists having this emblem of safety.

This mark of a good hoist means that the parts are made of rugged MALLEABLE IRON and FORGED STEEL. It means greater resistance to shocks and strains—lower maintenance. It means a 3½ to 1 factor of safety in EVERY part—with all the other advantages which this safety construction assures.

Send for Catalog 7-B

FORD CHAIN BLOCK COMPANY
2nd and Diamond Sts., Philadelphia, Pa.



The California Pipe Line Machine

because it effects a drastic saving in pipe line construction costs is used on practically all big pipe line jobs. The following companies and pipe line contractors are among our customers:—

Gulf Pipe Line Company	Andian National Corp.	Ford, Bacon & Davis
Humble Pipe Line Co.	Asiatic Pet. Co.	Geo. Greenan
Ozark Pipe Line Co.	E. A. Macpherson	U. S. Morris
Standard Pipe Line Co.	Connor & Sons	W. R. Morris
Oklahoma Pipe Line Co.	Williams Bros.	Hope Engineering Co.
Gypsy Oil Co.	Sheehan Bros.	

Machines for sale or lease.

California Pipe Line Machine Company

J. J. MAHONEY, President
KANSAS CITY, MO.

stalled so that it can be added to or subtracted from without interfering with the operation of the plant.

The two 112-horsepower boilers at the Bowlegs installation are of the semiportable water tube type. A steam turbine in the boiler room generates the electricity needed for the operation of the plant. For engine water cooling a 2,000-bbl. bolted tank is mounted on a fabricated steel support. A portable cooling tower is located above the tank. The elevation of this tank makes it possible to flow the water by gravity to the engines and gas coolers. Each engine unit has its own pump to return the water from the hot well to the cooling tower. Thus each unit is separate in its operation. This plant, which was built complete in 47 days, is producing approximately 20,000 gallons daily. It is expected that this output will be increased in the near future. The Roxana unit of plant construction and operation was described in detail in a paper presented at the last annual meeting of the Association of Natural Gasoline Manufacturers by S. S. Smith, superintendent of gasoline production. This paper was published in the May 26, 1927, issue of The Oil and Gas Journal, page 170.

BELTING COMMITTEE HAD DIFFICULT TASK

(Continued from Page 142)

which belts stretch under service tensions. The rate of stretch is recorded by knowledge of the number of cuts made and the amount of material removed on each cut.

Let us refer to Curve I. The total amount of belting removed from each belt is recorded so that at any number of days after starting to operate, it may be determined just how much of the stretch has been removed by cutting. Curve I is a composite line for 20 stitched canvas belts, six of which were 12 inches, 8 ply, and 14 of which were 12 inches, 6 ply. These belts were on wells averaging 3,536 feet in depth, seven wells on the swab handling an average of 439.7 bbls.

P. P. STAGG
Belting

of fluid with 40.7 per cent water, and 13 wells on the pump averaging 155.5 bbls. of fluid with 66.2 per cent water. By reading the curve for any number of days of belt service, it may be determined how much the average stretch or "cut amount" totals from date of installation until the date selected.

Curve II shows similar data for 40 friction surface type rubber belts, all of which are 12 inches, 6 ply. Data were collected on 12 swabbing wells having average load of 405 bbls. of fluid with 41 per cent water and on 28 pumping wells having average load of 171.8 bbls. of fluid with 61.4 per cent water. The average depth of these wells was 4,012 feet.

These two curves are not submitted for purposes of comparing the "stretch characteristics" of the two types of belts on which data were collected, for the cases are not comparable. The depth of wells, the number of swabbing and pumping wells, and also the quantities of fluid and percentages of water all differ in the two cases. However, the curves do indicate the period in the life of a belt during which stretch is most noticeable and also they give some practical idea of the average amount and frequency of belt cuts in the field.

Elasticity of Belts

During the past year, an attempt has been made to determine the relation be-

D. B. HARRIS
Belting

tween elasticity of a belt and the service performance of same. By "elasticity" is meant the belt's ability to return to original length after elongating due to imposed loads. Robert Burnett of the Humble Oil & Refining Co. has conducted a large series of tests in studying this characteristic at Rice Institute, Houston, Texas.

Basing his statements on these tests, Mr. Burnett summarizes the subject of elasticity in the following seven conclusions, all of which are tentative pending further research work before inserting any specification related to this subject into the regular A. P. I. standards.

1. That the power transmitting efficiency of a given belt is proportional to the ratio of recovery of elongation, which ratio I have called the elastic efficiency of the belt.

2. That losses accompany an elastic efficiency of less than 100 per cent and that most of these losses are cumulative as well as ascendant in magnitude.

3. That any of the presently available belts may be made elastically efficient in either of two ways, namely: (1) By the customary process of running in, and (2) By stressing in an amount slightly greater than the predetermined working stress.

4. That the effective life of a belt is that period during which the material possesses perfect elasticity. That it is neither a good belt prior to attaining that quality, not after losing it.

5. That the coefficient of static friction, slip impending, should not only be a maximum but should also be stable throughout the elastic life of the belt.

6. That changes of humidity and temperature affect the elastic properties of belting to some extent, but that these effects are of secondary importance and do not in any way weaken the validity of the practical considerations advanced.

7. That the manufacturer of belting is not properly responsible for unsatisfactory service when the user subjects his belt to such abuses as are known to impair the elastic properties of that belt.

Belt Fasteners

A belt is no stronger than its weakest point. The weakest point nearly always is the clamp. Even though clamps are replaceable, their failure involves much more than the cost of the clamp. That

VISIT BOOTH 31-OKLA. BLDG.
INTERNATIONAL PETROLEUM
EXPOSITION - SEPT. 24-OCT. 1

See for Yourself

how the Zero Hour is designed and constructed

~Our New 22-hour Bomb

COME to our booth at the Exposition. See for yourself the interior of the Zero Hour Electric Bomb—with no moving parts except those of a sturdy and accurate watch. Study the scientific care given to every detail of design, construction and materials.

then you'll know why the Zero Hour Bomb is SAFE and CERTAIN

WHEN you have seen our display at Booth 31, Oklahoma Building, you will understand why the Zero Hour Electric Bomb can't explode before the time for which it is set to explode—why it is accurate in timing, safe to handle and to run into expensive wells—why it WILL put off the shot under any conditions of heat, pressure, magnetic influence or presence of cavings.

A few minutes will enable you to realize why more than 4000 of Zero Hour Electric Bombs have been used successfully—why so many major operating companies specify that a Zero Hour Bomb must be used for detonating every shot in every well.

Our new 22-hour bomb can be set to allow from 12 to 22 hours before it explodes—and is designed especially for wells where an unusually long period of time must be provided for raising pipe, and doing other work to get the well in condition for shooting, after shot has been placed.

ZERO HOUR TORPEDO COMPANY
408 Cosden Bldg., Tulsa, Okla.
Day Phone 2-9612; Night Phones 3-1775, 3-7650, 2-6097

BORGER, TEXAS
Howard Culp
Phone 254, P. O. Box 254

SEMINOLE, OKLAHOMA
Geo. Pascoe
Phone 410, 518 Second St.

The Zero Hour Electric Bomb can be secured through all principal torpedo companies. The advice of our engineering and shooting staff is yours for the asking.

Zero Hour
Electric Bomb

Length 62 feet.
Diameter 10 feet.

WELDED PRESSURE VESSELS

**Limited to size only by transportation requirements—
Wall thickness up to 3½" and heavier**

P. I. W. Welded Pressure Vessels are the product of the same organization which has specialized for more than 35 years in tankage and steel plate construction for the Oil Industry.

Designed especially for the Oil Industry needs and brought into production only after the most exacting and painstaking tests, P. I. W. pressure vessels are establishing new standards of accuracy and strength coupled with minimum upkeep and low first cost.

Write for literature describing an unusual test of P.I.W. Welding.

P.I.W.
STEEL PLATE CONSTRUCTION

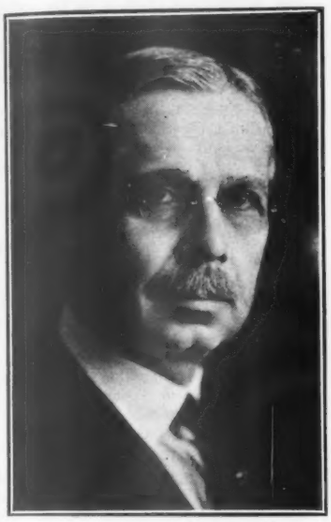
Plants:
**Sharon, Pa., and
Beaumont, Texas.**

THE
PETROLEUM IRON WORKS
COMPANY
NEW YORK CHICAGO SHARON, PA. HOUSTON TULSA

is a consideration of minor importance compared to lost time, danger of damaging the belt, lost production, etc.

Considerable data has been assembled on the subject of belt clamps. Glenn H. Bowlus of General Petroleum Corp. has conducted a series of tests to determine the characteristics of the ideal clamp. His conclusions are presented in the following report:

"Service tests have shown the superiority of curved fasteners over the old-fashioned straight bar clamp. The soft cushion or shoe placed under the upturned end of the belt has been found to give protection from rapid wear of



W. C. WICKERSHAM
Belting

the inner surface of the belts adjacent to those clamps. The use of improved belt clamps is urged as a means of prolonging belt life.

"The present laboratory tests conducted in May, 1927, are a supplement to the former tests of October, 1926, which were reported at the Tulsa American Petroleum Institute meeting. The results of these laboratory tests show the following essentials for clamp design which are supported by field usage.

"Design of Clamp Belt Fasteners for Oil Field Use

"(A) Essentials for good operation:

1. Alloy steel bolts, material to be S. A. E. No. 2,330 or better, form of thread to be S. A. E. without upset.
2. Nuts not to be case-hardened, and tolerance is to be the same as tolerance in bolts, so they will fit properly.
3. One-inch radius 90-degree bend for clamped end of belts.
4. Soft cushion or shoe to relieve shock on pulley.
5. Curvature to conform approximately to crown of engine pulley.
6. Light weight.
7. No lock washers.
8. Taper on thread end of belts to facilitate driving through.
9. Use of rust-resisting material.
10. Belting arrangement should be such as to require the use of only one wrench.

"(B) Essentials for high strength:

11. Bolt centers not over 2 inches. (Six bolts for 12-inch belt.)
12. Inside of clamp to be corrugated.
13. Filler to be of corrugated metal in combination with soft shoe mentioned in Item No. 4.
14. Top ends of belts to be bent back above the clamp by action of wedge-shaped metal filler.

"These suggestions are not intended primarily for the clamp manufacturer for there are a number of fasteners already on the market which seem to be fairly satisfactory, but it is hoped that the users may benefit by these improvements without further experimentation.

"Comparison of the results shows in the improved form of clamp that the weakening effect of the bolt holes has been counteracted somewhat by better gripping surfaces. This is due to the corrugation, improved fillers and stronger bolts.

"In comparison with the clamp type of fastener, it is interesting to note that the riveted plate fasteners and steel belt hooks show somewhat greater strength on all types of belting, but the successful use of such fasteners must be determined in the field because of the peculiar methods of application. In some oil fields these have been used to considerable advantage.

"The vulcanized rubber splices have high strength and would be highly desirable where the belt could be made endless in the field."

Marking Belts for Identification

In following the records of belts in the field, some permanent means of identification must be had. Simple as it may seem to mark a belt in such a manner as will make it possible for a record to be prepared after the belt has worn completely out, no really satisfactory method has as yet come to light. A special subcommittee is now working on this problem.

The recommendations of manufacturers of all types of belts were collected during the past year. As yet no method used by manufacturers at the factory has proven wholly practical for field marking. The different schemes suggested, however, were actually tried out under accelerated tests to see if they would stand up. Certain promising methods were selected from the large collection of suggestions which included: painted stencils, embossed rubber symbols, rivets, linen tags, clips, tabs, wire strands, metal pieces for attaching to clamps, thin-shanked, flat-headed bolts, transfer rubber labels, steel die stamped symbols, edge painting, staples, sewed labels, etc.

The following markings were tested by attaching to belts operating in the field:

(1) Linen tags.
(2) Paint.
(3) Rivets.
(4) Metal tags sewed to the belt with copper and steel wire.
(5) Metal tags held to the belt by staples.

Results:

1. The paint used was Duco. The number was placed on the back of the belt. While the result appears good, our actual field application was not very successful.

J. F. CHAMPION
Belting

2. A metal tag was tried, held to the belt with metal staples. The staples were chosen and put on so that they were clinched on the pulley side of the belt and the points turned back into the belt. One staple is completely worn out and the other very nearly so. This type of markings was not successful.

3. In this case a metal tag was sewed to the belt with metal wire. The wires on the pulley side soon wore out and the

PATRICK CARBON
for Diamond Core Drilling

"Specify Patrick Carbon"

THE entire Patrick carbon organization is available to you at any and all times. If the combined experiences of men, who have specialized in the buying and grading of carbon for many years, can help to solve your drilling problems—do not hesitate to let us know.

SEND FOR BOOKLET

You can get in touch with our representative by wiring Duluth office

R. S. PATRICK
Duluth, Minnesota, U.S.A.
Cable Address, "Exploring" Duluth

OTHER "PENBERTHY" PRODUCTS
Ejectors
Cellar Drainers
Oil Gages
Water Gages
Oil Cups
Grease Cups, Etc.

PENBERTHY PRODUCTS

Special High Pressure Automatic Injector

Write For Catalog

Owing to the increasing demand in the oil fields for injectors to operate on higher pressures, this high pressure injector is recommended where boilers are operated at pressures to 200 pounds.

PENBERTHY INJECTOR COMPANY
Established 1886
Canadian Plant: WINDSOR, ONT., CAN.
1260 Holden Ave., DETROIT, MICH.

BELT SLIPPAGE

on pumping operations means

Less Production

YOU CAN PUMP MORE OIL with LION PAW BELTING

It is the most positive and efficient belt ever made for oil field service. Realize the benefits and unusual quality by a trial order.

LION PAW BELTING

"runs without dressing"

Sold by
SLATER BROTHERS
TURNBUCKLE DERRICK CO.
Sand Springs, Okla.

BUCKNER PROCESS CO.,
Worcester, Mass., U. S. A.
Sole Manufacturers

Headquarters for
Non-corrosive and Heat Resisting Alloys

SWEETALOY
Castings of
CHROMIUM IRON—STAINLESS STEEL
NICKEL CHROME IRON ALLOYS

Sweetaloy Still Plugs

PUMP PARTS VALVE TRIM

WM. J. SWEET FOUNDRY COMPANY
Irvington, N. J.

BE AMONG
THE BEST
INFORMED
OIL MEN

Read The Oil and Gas Journal every week.

It will keep you reliably informed and provide you with information not obtainable elsewhere.

tag became loose. This type of marking was given no further consideration.

4. The linen tag seems to work all right for a short time. On longer tests it is whipped off by the action of the air against the tag. The leading side of the tag turned back. When this happens the tag will not last much longer. This type of marking is not considered practicable.

5. Crescent rivets were used in this case. A single number is stamped on each rivet as 1, 2 and 3, making the belt's number 123. These rivets are placed so that they come in contact with

L. C. HAMPTON
Belting

the pulleys one at a time. In practice, the belt is numbered in this fashion in several places so that if a rivet is lost in one place it may be found in another place and the complete number be available.

Conclusions:

1. Duco paint may be used for numbering rubber belts.
2. Steel die stamping may be used for marking leather belts.
3. That it is possible to develop rivets for marking all types of belts.
4. That metal tags may be used on belt clamps where the man that keeps the belt records also installs, replaces and shortens belts when necessary.
5. That metal tags are not practical when attached to the belts.
6. That linen tags are not practical for oil field use on any type of belt.

Care and Usage

In as much as the attention of the user is as important as the quality of the belt when it comes down to a final conclusion as to length of service, a guide for the care of oil field belting has been included in the belting specifications.

This collection of facts is based on actual experiences in the field. The specifications are based on laboratory considerations. "Care and Usage" tables should serve as policy guides in using belts to obtain the most efficient service.

These rules are presented:

1. Keep belts tightly rolled until ready to apply.
2. Always use a square in cutting belts and in laying out bolt holes.
3. Use a very small punch or drift pin in making holes in a hair or fabric belt. For rubber, solid woven cotton, leather, stitched cotton and balata belts use a punch 1-16-inch smaller than the bolt.
4. Inspect clamp bolts frequently and keep them tight.
5. When using belt clamps with filler, replace the filler when it becomes sufficiently worn for the belt to start wearing at the clamps.
6. Keep faces of pulleys and bandwheels free from dirt and other foreign material.
7. Do not allow water, tar, lubricating oil, grease or cement to get on belt or pulleys.
8. Do not use metal inner tubes, stick dressing, paraffin or other similar materials for belt dressing.
9. If belt dressing recommended by the manufacturer is not available, use only vegetable castor oil on belts other than leather, and then only at such time as it becomes absolutely necessary. Use this material very sparingly on hair and fabric belts and only on rubber and balata belting at such times as they have a tendency to slip.
10. Use neatsfoot oil for belt dressing on leather belts and apply it on the outside of the belts.
11. Do not run the lap in a leather or step-spliced belt against the pulley.
12. Keep the pulleys in alignment.
13. Keep all of the belt on the pulleys.
14. Do not permit belt to rub on engine sill, sand reel sill, belt house roof, or any other part of the belt house.
15. Run the belt as loose as possible without slipping.
16. On bandwheel powers release the tension on the belt at the idler when the power is shut down.
17. Use properly heat-treated steel bolts for clamps.
18. Horsepower transmitted (see manufacturer's tables).
19. Store all belts in as cool a place as possible.
20. If possible, use belt stretchers in applying the belts to the pulleys. If belt stretchers are not available, use soft rope.
21. Keep the belt house as near weathertight as possible and properly drained. It is also recommended that the belt house be floored.
22. Keep an accurate belt record.

Standard Belt Record Form

The A. P. I. Belting Committee has adopted a standard form which it submits to the industry for use in compiling data for the use of the companies in determining service performance of their individual belts. It is simply a method of collecting the information required with the least effort possible and with no pertinent details omitted from the report.

This card is recommended for usage for all types of belted drives, whether on wells, powers, gasoline plants, oil pumping stations, refineries, or on other installations. Particular effort has been taken to make the card perfectly adapt-

FRANK O. PRIOR
Belting

able to the oil well, as this installation requires the overwhelming majority of belts purchased. By slight adjustment of the form, all cases may be accommodated.

A second valuable use for this standard form will be found in submitting performance data to the A. P. I. Belting Committee for purposes of record. These forms then may be studied in a systematic manner to determine what circumstances accompany long life and what ones accompany short life. The findings of such a large scale study would be pre-

NOW COMES THE NEW
TYPE "M"
LORRAINE *Automatic* Gas and Oil Separator

Like the several other types of Lorraine Separators, the new Type "M" was produced to meet a specific need not called for in previous models.

The Type "M" is designed expressly to handle a large quantity of gas with an ordinary quantity of oil, and to handle the gas at atmospheric pressure.

This latest Lorraine Separator is an entirely new design possessing many exclusive advantages for the particular service intended. The valves are more easily operated and absolutely accurate.

This is brought about through the new float construction which operates in a vertical position in the trap instead of on an angle. Like all other Lorraine Separators it has the same popular sleeve valve construction.

The Type "M" is characteristic of all Lorraine Separators—compact, efficient, positive in action—the acme of engineering skill in design and construction.

Send for folder giving detailed facts about this new separator designed to handle automatically a large quantity of gas at atmospheric pressure.

THE LORRAINE CORP.

Manufacturers and Distributors
OIL WELL SPECIALTIES
115th and Alameda Streets
Los Angeles, Calif.

Oklahoma Branch:
The Lorraine Corporation,
406 West First Street,
Tulsa, Okla.

Arkansas Branch:
Southern Specialty Co.
523 S. Washington St., Box 1796,
El Dorado, Arkansas

Kern County Representatives:
New Method Pipe Slotting Company
Phone 465 Taft

FOSTER PETROLEUM CORPORATION

Producers of

PETROLEUM, NATURAL GAS *and* NATURAL GASOLINE

Bartlesville, Okla.

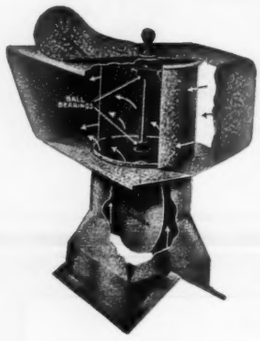
H. V. Foster, *Pres.* Burdette Blue, *V. Pres.* Paul F. Dahlgren, *Treas. and Gen. Mgr.*

BURT

Direct Connected Fan Ventilator

Ten times greater exhaustive power than other types immediately recommends it for Pumping Stations, Boiler Houses, Gasoline Plants and in fact any building that requires perfect ventilation.

Low power consumption and dependable. Retards fire as does our sliding cone damper fire retarding ventilator.



Our Revolving Ventilators are known for their efficiency and large ventilating capacity. Ball bearings prevent sticking. Adjustable damper in base below the revolving section assures a high ventilating efficiency.

We can furnish a size and type ventilator to meet every requirement.

Burt Exhaust Heads save fuel, boiler and water—prevent trouble and accidents. Write for descriptive literature and prices.

Burt Oil Filters meet present day demands with higher efficiency in operation, permitting economy of space over other types. Write for complete catalog of Burt Filters. Buy to meet present requirements, additional units may be added as needed.

THE BURT MANUFACTURING CO.

929 S. High St., Akron, Ohio

Pioneer Oil Filter Manufacturers

sented to the industry so that any benefits would be available to all.

The standard form herewith submitted is tentative only. Suggestions are desired on changes or additions which might make it more effective. It is hoped that the form may be adopted in final shape within the coming year.

Field Results of A. P. I. Belting

Inquiry was made from one oil company which has a very efficient system for checking the field performance of its belts and which company is entirely "sold" on the practicability of demanding A. P. I. products. Opinion was obtained as to how A. P. I. belts were standing up with other belts. The reply is presented herewith as received less than a month ago from the company questioned:

In view of the fact that the purchasing of belting made according to A. P. I. specifications is comparatively new, only a few records have been received to date.

A. P. I. BELT RECORD
(TENTATIVE)

This tentative belt record form is recommended for the use of oil companies in recording belt data for their own study and also for the use of the Engineers Sub-Committee of the Special A. P. I. Belting Committee.

DIRECTIONS:—EVERY BELT WHEN CUT TO SEND OUT IS TO BE SUITABLY AND PERMANENTLY NUMBERED. THIS RECORD MUST BE KEPT FAITHFULLY BY TOOL PUSHER, FARM BOSS OR PUMPER IN CHARGE WHERE BELT IS USED. IT SHOULD BE PROVIDED A SAFE PLACE IN ENGINE HOUSE OR POWER HOUSE AND BE KEPT AS CLEAN AS POSSIBLE. IT SHOULD ALWAYS ACCOMPANY THE BELT AND WHEN BELT IS STORED OR JUNKED RECORD IS TO BE SENT TO THE MAIN OFFICE; NEW RECORD TO BE STARTED IF BELT IS RERUN.

COMPANY _____ FIELD OFFICE _____

BELT RECORD

BELT No. _____ SHEET No. _____

DESCRIPTION OF BELT

SIZE _____ PLY _____ LENGTH _____

KIND OF MATERIAL _____ NAME _____ PURCHASE ORDER _____

SURFACE, FRICTION _____ (X) SMOOTH _____ (X) STITCHED _____ (X)

PURCHASE FROM _____ PRICE PER FOOT _____

WAS BELT MADE IN ACCORDANCE WITH A. P. I. BELTING SPECIFICATIONS? _____

DESCRIPTION OF LOAD BEAM-WELL

WELL NO. _____ LEASE _____ DEPTH OF WELL _____

SIZE TUBING _____ SUCKER RODS, SIZE _____ MAKE _____

SIZE ENGINE OR MOTOR _____ H. P.: SPEED _____: SIZE ENGINE PULLEY, FACE _____: DIAM _____

SIZE BAND WHEEL _____ SIZE COUNTER SHAFT PULLEYS _____

IS BEAM COUNTERWEIGHTED? _____ HOW WITH? _____

WHAT IS DISTANCE FROM BEAM SADDLE TO COUNTERWEIGHT SUSPENSION? _____

DYNAMOMETER WEIGHING, DEAD WEIGHT _____ MAX _____ MIN. _____

HOW OFTEN IS WELL PULLED? AVERAGE No. OF DAYS _____

STROKES PER MINUTE WHILE PUMPING _____

LENGTH OF STROKE _____

AVERAGE HOURS PUMPING TIME PER DAY _____

DESCRIPTION OF LOAD BAND WHEEL POWER

POWER No. _____ LEASE _____

GIVE COMPANY NUMBERS OF WELLS ON THIS POWER _____

SIZE BAND WHEEL _____ MAKE _____

SIZE ENGINE OR MOTOR _____ H. P.: SPEED _____: MAKE _____: CYCLE _____

ENGINE PULLEY, FACE _____ DIAM _____

COUNTER SHAFT PULLEYS, DRIVEN _____ DRIVER _____

HOURS PER DAY POWER IS RUN _____ AVERAGE No. WELLS HOOKED ON _____

AVERAGE DISTANCE TO EACH WELL _____ AVERAGE DEPTH _____

IS POWER WELL BALANCED MOST OF THE TIME? _____ AVERAGE PUMPING TIME PER WELL _____

WHAT KIND OF BELT DRESSING IS USED? _____ HOW OFTEN? _____

MAKE AND TYPE OF FASTENER USED _____

WHAT IS YOUR OPINION OF BELT? _____

DATE TRANSFERRED _____ BY _____

JUNKED _____ POSITION _____

DATE _____

FILL IN SERVICE RECORD ON OPPOSITE SIDE.

SERVICE RECORD

DATE From	DATE To	OPERATION (See Next Note*)	Size Hole	Total Depth	To Depth	REPAIRED OR CUT Date	REPAIRED OR CUT Reason	Hours Off	REMARKS

SUMMARY OF SERVICE

Days belt was on location

Actual days of service

If belt was ruined or worn out prematurely, give causes and details:

MAKEUP OF TOOLS

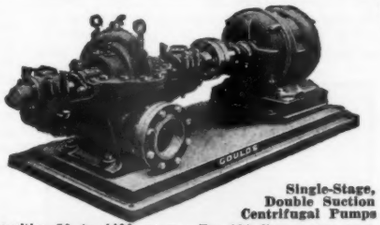
PRODUCTION

	SWABBING Total	SWABBING Daily Av.	PUMPING Total	PUMPING Daily Av.	AGITATION Total	AGITATION Daily Av.
Bbls. oil						
Bbls. water						

*Drilling, underreaming, fishing, reaming, cleaning out, pulling rods, tubing.

While we have a number of A. P. I. belts now running, we do not check the records until belts have been taken out of service completely worn out. Some of the records we have received are for belts that were damaged beyond repair—a record of which, for statistical data, is of little consequence.

However, from results thus far obtained and observance of those now in operation, we can safely say that belts having strength and elongation characteristics which meet A. P. I. specifications are much more desirable than the average quality of belting. Our records on A. P. I. belting actually show longer



Single-Stage, Double Suction Centrifugal Pumps

Capacities 50 to 4400 g.p.m. For 100 lbs. average max. working pressure. Standard fitted; bronze fitted; all iron, or all bronze. For direct connection to motor, steam turbine and gasoline engine, or with pulley for belt drive. See Bulletin 125.

GOULDS PUMPS for

every Pumping Condition in the Oil Industry

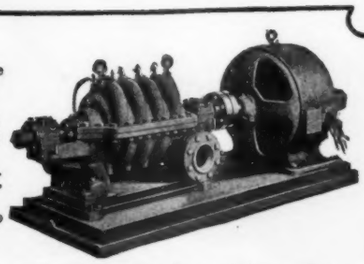
There is a standard type and size Goulds Centrifugal or Reciprocating Pump for almost every oil pumping condition: gathering, station, refinery and Pumps for all process work.

Unnecessary types and sizes are eliminated. This means a greater capacity to serve you with pumps built in volume and carried in stock. Improved design affords efficient, economical operation. Modern manufacturing facilities insure quick shipment and prompt service.

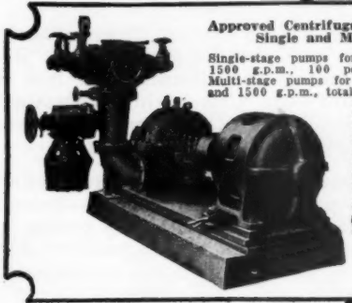
GOULDS PUMPS, Inc.
Seneca Falls New York

Multi-Stage Centrifugal Pumps

A new pump of volute construction with exceptionally high efficiencies. In 3 in. to 8 in. sizes, and 2 to 6 stages. Capacities 60 to 2000 g.p.m. Suitable for working pressure up to 325 lbs. Bronze fitted, all iron or all bronze. For direct connection to motor, steam turbine and gasoline engine or with pulley for belt drive. See Bulletin 129.



Approved Centrifugal Fire Pumps Single and Multi-Stage



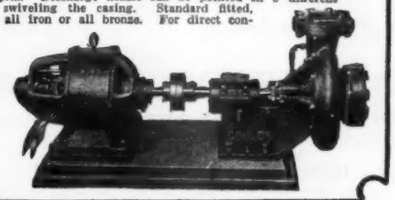
Single-stage pumps for 750, 1000 and 1500 g.p.m., 100 pounds total head. Multi-stage pumps for 500, 750, 1000 and 1500 g.p.m., total heads up to 150 pounds. 2 to 8 fire streams. Complete Underwriters fittings. For discharging direct into hose lines or use with automatic sprinkler systems. For direct connection to motor or gasoline engine. See Bulletin 118.

Triplex Plunger Pumps

For 150 lbs. working pressure. Displacements range from 2 to 350 g.p.m. Sizes from 1¼-in.x2-in. to 8-in.x10-in. Standard fitted, bronze fitted, or all iron. Furnished for gear connection to electric motor, or with pulleys for belt drive.
See Bulletin 101.

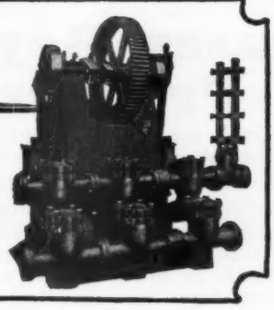
Single-Stage, Single Suction Centrifugal Pumps Enclosed Impeller Type.

A moderately priced pump of high efficiency. Capacities 40 to 3200 g.p.m. Discharge nozzle can be pointed in 8 different positions by swiveling the casing. Standard fitted, bronze fitted, all iron or all bronze. For direct connection to electric motor or with pulley for belt drive. See Bulletin 119.



Single-Acting Triplex Plunger Pumps—High Pressure Type

A complete line of high-pressure pumps for a wide variety of conditions. Working pressures range from 100 to 1500 pounds, and displacements from 50 to 1150 g.p.m. Furnished for gear connection to electric motor or with pulley for belt drive.
See Bulletin 103.



The refinery engineer's "conning tower"

Bristol's

The most extensive line of Recording Instruments; including recorders for Pressure, Liquid Level, Temperature, Electricity, Motion, Speed, Humidity, etc. *Ask for Bristol's Catalog.*

The "Super" cannot be everywhere at once—so the five Bristol's Recording Instruments give him a bird's-eye view of his processing. No chance of poor product or reruns under these conditions.

Designed with two objects in mind—precision and sturdiness—Bristol equipment is protecting profits in many of the best refineries. *Ask the Bristol engineers to cooperate with you.*

The Bristol Company Waterbury, Connecticut

FOR 38 YEARS — Ask Any Technical Engineer — MAKERS OF

BRISTOL'S RECORDING — INSTRUMENTS

We invite the oil fraternity to make use of our wire facilities while in Tulsa

MEMBERS	STOCKS
New York Stock Exchange	BONDS
New York Curb Association	
Chicago Board of Trade	COTTON
Chicago Stock Exchange	GRAIN

STRANDBERG, McGREEVY & CO.

Main Office—924 Baltimore, Kansas City, Mo.

BRANCHES:
Tulsa, Okla., 19 Atlas Bldg.
Bartlesville, Okla. Wichita, Kans.
Oklahoma City, Okla.

Leases, Royalties, Production

are sold quickly, profitably, through The Oil and Gas Journal Classified Wants. Each week many of our classified users write us attesting to that fact.

Journal classified ads can get results for YOU. Send us a list of your holdings today, including as great a variety as possible so that a large number of readers may be appealed to. Oil companies and prospectors are looking for new acreage every day. You may have just what they want. Give them an opportunity to buy it from you by advertising now.

The Oil and Gas Journal
Classified Wants Department

service, on an average, than belting that falls below the qualifications. We can attribute this to two things:

First, that having better material and superior strength, as well as proper elongation, the A. P. I. belt is more capable of handling shock loads without too great a strain, so that some of the elasticity or "life" of a belt can be retained for stresses that are continually being thrown upon it throughout its service. In other words, there is some reserve strength present; for example, if a belt

WARD B. BLODGET
Belting

having a strength of 300 pounds per inch width per ply could stand the abuse of a heavy swabbing or pumping load, for a specified length of time, certainly a belt having 50 to 100 pounds per inch width per ply higher strength, would last at least a proportionately longer period of time. It is very probable that the stronger belt, with its proportionately greater elastic properties, would double the service of the weaker belt.

Second, the service of all belts has materially increased and the percentage of damaged and ruined belts decreased, partly due to having "belt inspectors" looking after belts in the field and improving the conditions under which belts must run, and partly due to the use of better quality of belting. It has not yet been definitely proven that the increased service of A. P. I. belting is dependent upon the strength and elastic properties, as mentioned above. However, by the system of records now being followed, information on this question will only be a matter of summarizing the service data of belting after enough time has elapsed to furnish these statistics. This will include a check on speed, horsepower, loads, pulley diameter and center distances, stretch, breaks, and condition of house. Also whether load was distributed by counterweights or other devices and the type of engine used.

Supervision of Field Service of Belting

The A. P. I. Belting Committee recommends that large purchasers of belting follow up the results of their field experience through the services of some specially designated individual who either may spend all or part of his time on such work. This plan produces many time-saving and money-saving advantages. One Mid-Continent oil company describes this plan of supervision in the following paragraphs:

It has long been known that tool pushers, farm bosses, drillers, etc., are not methodically disposed to the keeping of proper records of material used under their direction. If they are relied upon for certain information the result is usually more or less questionable. Therefore, there is only one system which can operate successfully in connection with checking of material under field working conditions, and that is by having a party "specialize" in the supervision of that material, whether it be wire lines, belting, compressors, etc. We have solved the field data problem to some extent by employing "belt inspectors," or "material inspectors." Of course, new problems repeatedly confront us in this connection, and only actual experience will lead us to a correct method of procedure for these inspectors to follow.

At the present time our inspectors are doing some excellent work in going from well to well on a regular routine. It is their duty to see that all belt houses are kept in good condition, and that there is proper alignment of pulleys and bandwheels; when a belt is put on they should supervise the work so that the ends of the belt are clamped together properly and with satisfactory tension for operation. When a belt is cut, or breaks and has to be repaired, they must see that the work is handled carefully. The inspectors note the conditions of the belting in the various stages of service—when to apply dressing, when to cut on account of stretching, and when to insert a new piece of belting in place of a burnt or badly worn out section. In this manner, one man can specialize on the work and handle a certain area very efficiently, thereby avoiding much loss of time and careless or hurried field handling by men who often times are not well informed on up-to-date methods. Then, after a belt is worn out, the inspectors send in their report and record of its service. The Belt Record Form we use for this purpose is as exhibited elsewhere in this report.

The "specialist," as it were, does not have to be a technical man, as his duties only require him to follow instructions from the engineers in charge. The Engineering Department, in turn, receives the information desired on service, field conditions, etc., and through careful study and correlation of data can determine finally what belt to specify for certain conditions and can direct more definitely the care and handling of the belting in operation. Other details, such as type of belt clamps used, method of splicing, dressing and how to apply it, and controlling the stretching of a belt are also carefully observed.

To give the proper assistance to the Engineering Department the inspectors

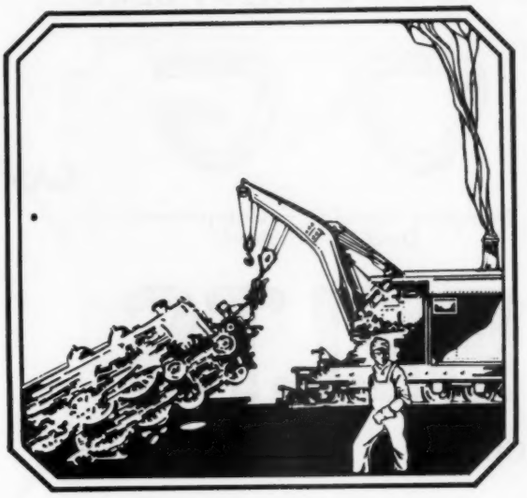
A. R. EDSELL
Belting

must be granted certain privileges in the field. The best results are obtained by a man capable of securing the co-operation of superintendents, farm bosses, and the different crews with which he must come in contact. Inspectors should make their reports systematically to the engineer directing the work. In this way, the otherwise difficult task of checking up on belting, or any other similar material, is only a matter of supervision all the way through, and the efficiency of the system is dependent upon the men in charge, as well as directions from the main office to the field superintendents

STAMINA to Stand Up Under Excessive Loads

Hoyt's Trojan is the finest babbitt you can buy for use wherever tremendous loads put excessive strain on the bearings, as for instance in locomotive cranes. It has been a standard in industry for years.

Hoyt's Great Eight includes a Babbitt Metal for every purpose, made especially for that particular type of work. Send for your copy of "Babbitt Metal Data", a booklet which contains a wealth of valuable information. It is yours for the asking.



HOYT'S GREAT EIGHT

Genuine "A" Babbitt	*Oil Engine Babbitt*
Eagle "A" Babbitt	*Gas Engine Babbitt*
Trojan Babbitt	*Faultless Babbitt*
Electric Railway Babbitt	*Standard No. 4 Babbitt*

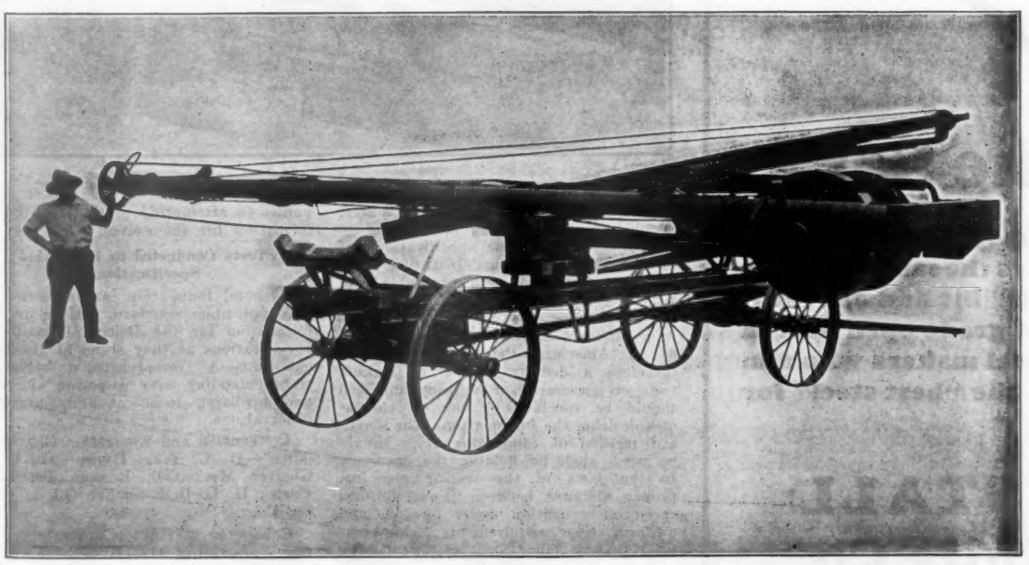
HOYT METAL CO., St. Louis
NEW YORK CHICAGO DETROIT

Address Department F

Trojan Babbitt is excellent for use in steam engines, motors and internal combustion engines where the service required is not excessive, also in dredges, hoisting engines, tractors and harvesting machinery.

HOYT Babbitt

TIME TELLS THE TALE



Years of sturdy service and dependability has proven the IRON KING pulling machine to be the best asset on a lease. It pulls the deep ones and the hard ones and it keeps them on the job. It's popularity is shown by the fact that it is used extensively in practically every oil field in the U. S. A. as well as in foreign fields. Its durability is shown in the fact that the first IRON KING taken into Pennsylvania in 1907 is still going strong.

If your oil well supply store will not get you an IRON KING write us direct. We have a catalog for you.

THE IRON KING MANUFACTURING COMPANY
BRADNER, OHIO

Say you saw it in The Oil and Gas Journal

"A REAL OIL COUNTRY BELT"

O AND G

OIL GAS

Pumping–Drilling — Compressor
Double-Stitched

BELTS

RUGGED DURABLE

Not just A belt but a REAL POWER TRANSMITTER

ECONOMICAL

Manufactured by

IMPERIAL BELTING CO., Chicago

Sold by

OIL WELL SUPPLY CO.

In All Fields

H

Always the Same

Not just a "steel"—that may be good at times—but a steel that is always the same—always dependable—Diamond "H" Bit and Jar Steel is made from the highest grade open hearth ingots by experienced steel makers who aim at all times to produce the "best steel" for oil well drilling tools.

HEPPENSTALL
Forge & Knife Co.

Pittsburgh, Penna.

Fort Worth - Texas Office
1415 F. & M. Bank Building

or those in charge of operations, to facilitate co-operation.

Checking Belting for Conformity to A. P. I. Specifications

Purchasing agents want to know how they may determine that the belt they are asked to buy meets A. P. I. requirements. In many cases, this question is answered by the belt specialist within the company as the result of his tests. However, to determine the characteristics of any lot of belting purchased, the A. P. I. Committee recommends that actual tests be conducted on a sample or two taken from that lot of belting. If the belting does not meet specifications, it may be rejected or an adjustment demanded. The following explanation may outline the method of obtaining information for the purchasing agent.

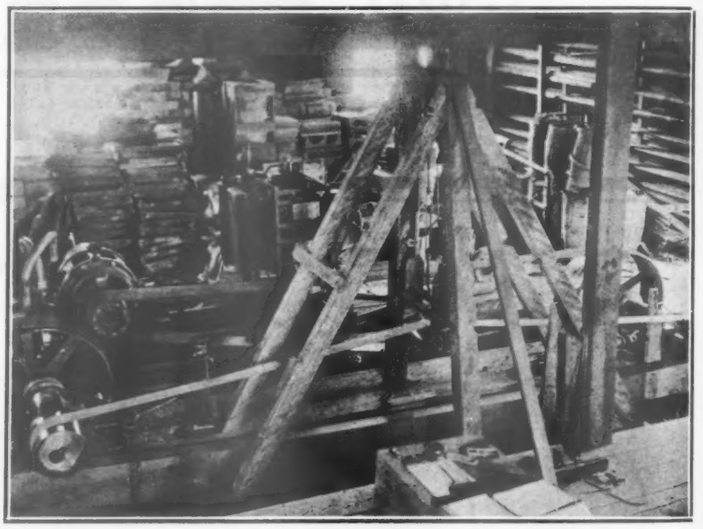
An oil company can keep proper check on all belting purchased by having samples of each roll received sent to a testing labratory for examination and report. For this purpose it is necessary to cut one or two samples, 20 inches in length, from each lot which can be tested for elongation, breaking strength, etc. It is desirable to have two specimens tested n order to get more accurate results, as one will serve to check the other. While information received in this manner is a definite method of checking up on the belt manufacturers' products to determine whether or not they are conforming to A. P. I. specifications, it is practically of no value unless used in conjunction with actual field service records of such belting. However, by studying laboratory results and following the belt through its service systematically, a table of recommendations and relationship between strength characteristics and new usages, it is necessary to alter portions of the specifications from time to time. Those parts which it is thought should be given more thorough investigation before a final standard is presented are submitted as tentative specifications only. When new developments prove that they are not wholly correct, they are then classified as final specifications.

At all times, then, the A. P. I. belting specifications are to be considered as indicative of the best standards of belting quality justified by information and data available at the time.

The specifications are prepared only for the oil industry. The characteristics regulated for oil conditions may be of little importance for some other industry. We must admit that oil field conditions are different than those of almost any other industry, and perhaps we may go farther and state that they are as severe or more so than those of any other.

There can be no other motive behind the effort than that of service to the industry. Oil company engineers and executives have developed the specifications so that they may realize economies and enjoy less confusion in purchases. It has been an efficient and economical way to find out about the belts we have to use. Being constantly maintained in an up-to-date condition, all companies may realize the benefits of new developments as they occur.

Sums of money have been spent to accomplish the standards developed so far and the oil companies have paid for the work themselves. But the total amount spent is not comparable in size with that which would be spent in a haphazard manner by individual com-



General view of equipment used in "Fatigue Test" on belts

may be built up as a reliable source, which is really necessary in checking up satisfactorily with the specifications of the American Petroleum Institute. This has been found to be a profitable procedure to follow in practical purchasing.

Some laboratories conduct their tests in a different manner than recommended by American Petroleum Institute; therefore a definite method of making tests on specimens of belting sumbitted should be specified by the oil companies desiring the information. The standard method of conducting tests should be used, such as holding the specimen in the jaws of the testing machine, proper distance between jaws, uniform speed of separation under tension, and uniform time requirement. Engineers interested in laboratory testing of belts will find it to their advantage to adopt for themselves the A. P. I. type of jaws to be used in testing machines, specifying the use of said jaws for testing their samples of belting. This would tend to standardize the method of testing and the results obtained would be very reliable.

Nature of the Specifications

Due to the development of new phases of belt manufacture, research findings, panies in attempting to find out the information for themselves.

Tests Conducted to Determine Specifications

A sound foundation is the essence of an applicable standard. Here is the foundation for the Belting Committee's specifications as they stand at the present time—A comprehensive series of tests extending over a period of years and involving technical and practical observations.

1. "Tension and Elongation Characteristics"—D. L. Trax, Gypsy Oil Co.; Glenver McConnell, Roxana Petroleum Corp.; E. L. Bell, Shaffer Oil & Refining Co.

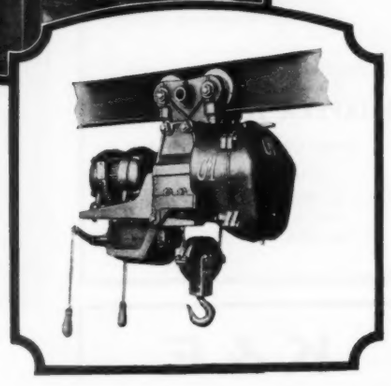
Conducted at Hunt's Laboratory, Chicage (a series of 117 tests).

2. "Tension and Elongation Characteristics"—G. H. Bowlus, General Petroleum Corp.

Conducted by General Petroleum Co. laboratories, Los Angeles, Calif. (two series of 125 total tests).

3. "Elastic Properties of Oil Field Belting"—Robert Burnett, Humble Oil & Refining Co.

Conducted at Rice Institute, Houston, Texas (a series of 18 separate tests).



Around the plant or in the shop where the lifting job is continuous, a "C-M" electric hoist will do the work of from two to ten men — will do it quicker, better and with more safety.

For Quicker and Easier Lifting Standardize on "Cyclones"

THERE'S a lot of heavy lifting to be done in a hurry around an oil field. And there's no better way to do it than to standardize on "C-M" "Cyclone" hoists, "C-M" "Matchless" Trolleys, and "C-M" "Matchless" Derrick Cranes.

The exclusive gyrating principle plus the constant oil bath of the Cyclone hoist get the job done in less time, with less effort and with more safety. The flangeless track wheels plus the Timken Tapered Roller Bearings of the Matchless trolley prevent binding and scraping and reduce friction to a minimum.

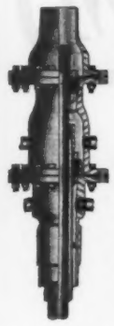
There's a "C-M" Material Handling Expert on the job in the oil fields all the time. He'll gladly assist you—without obligation—in working out the quickest and easiest way to move the heavy things. Write direct or to the leading oil well supply house in your territory.

THE CHISHOLM-MOORE MANUFACTURING COMPANY
5020 Lakeside Ave. · Cleveland, Ohio

CHISHOLM-MOORE

CHAIN HOISTS — CRANES TROLLEYS CUPOLA CHARGERS — ELECTRIC HOISTS

Warren Control Head



A Safety Device for Wildcat and High - Pressure Territories.

The Warren Control Head is a highly perfected and thoroughly dependable device for use in wildcat and high-pressure gas fields, providing a simple and positive means of controlling heavy gas pressure.

It consists of but three main parts; the flanged body, the intermediate cap, and the top cap. The body also functions as a blow-out preventer, and the flange provides means for running a connection out to the Christmas Tree.

The top cap can be set down directly upon the body if desired. The intermediate cap enables running a tubing string inside of pipe already set, with both strings under control, and then connecting to the Christmas Tree. As many intermediate caps as required can be used.

Complete Particulars on Request.

SHAFFER TOOL WORKS

Brea, California, U. S. A.

Distributed by:

Robt. N. Atmore Co., Tulsa, Okla.

Robt. J. Miller Co., Houston, Texas

K & E Steel Tapes

for *exact* measurements

GUARANTEED Accuracy and easy operation make K & E Tapes the logical ones to use. Our "Keco" *rust-resisting finish,* increases the life of the tape line.

The illustration shows our

No. 7142-T for Oil Gauger's use.

We carry tapes for gauging both *high* and *low* gravity oils.

Tape Catalog Free
Send for It Today!

KEUFFEL & ESSER CO.

NEW YORK, 127 Fulton Street, General Offices and Factories, HOBOKEN, N. J.

CHICAGO 106-108 S. Dearborn St. | ST. LOUIS 817 Locust St. | SAN FRANCISCO 30-34 Second St. | MONTREAL 9 Notre Dame St. W.

Drawing Materials, Mathematical and Surveying Instruments, Measuring Tapes

4. "Fatigue Tests on Belts"—F. O. Prior, Midwest Refining Co.
Conducted at Midwest laboratory, Casper, Wyo.
5. "Testing Machine Jaws for Belts"—G. H. Bowlus,
Conducted at General Petroleum Co. laboratories, Los Angeles, Calif.
6. "Belt Markings Tests"—F. O. Prior.
Conducted at Casper, Wyo.

Practical Field Observations and Tests

D. L. Trax, Gypsy Oil Company.
Glenver McConnell, Roxana Petroleum Corp.
E. L. Bell, Shaffer Oil & Refining Co.
L. B. Holland, Phillips Petroleum Co.
Robert Burnett, Humble Oil & Refining Co.
G. H. Bowlus, General Petroleum Corp.
Donald Dickey, General Petroleum Corp.
F. O. Prior, Midwest Refining Co.
L. T. Gibbs, Phillips Petroleum Co.

views in mind: To learn more about elasticity characteristics of belting, to develop "fatigue" or "breaking down" tests for belts, to arrive at a final application form of belt record chart for the oil industry, to investigate further the elongation characteristics of those types of belting whose specifications are now classified as tentative, and to find out about many other matters which will aid the user in his attempt to get 100 per cent service out of belt purchases.

PROPER CARE AND USE OF OIL FIELD BELTING

(Continued from Page 144)

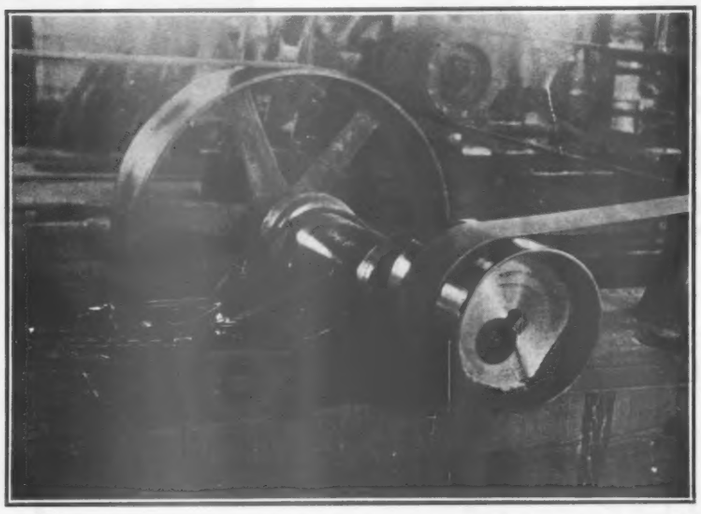
holes punched parallel to this end. The bolts in fastener should be tightened at intervals to insure a frictional grip of fastener.

Lubricating oil should be kept from belts by installing guards or pans.

No gummy belt dressing should be applied to belts but if necessary to use a belt dressing, use vegetable castor oil very sparingly.

Belt houses should be kept in good repair at all times as protection against weather conditions.

As a conclusion, I would like to emphasize the fact that by careful and regular inspection of belting in service, and by a systematic educational program among the operators on the care and use of belting, many belting troubles will be eliminated and a higher percentage of effective work secured with less loss of production.



Countershaft and eccentric pulley used to create alternating tensions within the belt on "Fatigue Test"

Ned Beaudreau, Roxana Petroleum Corp.
Ray Skinner, Skinner Bros. Belting Co.
D. B. Harris, Humble Oil & Refining Co.
Charles Homer, Rio Bravo Oil Co.
S. J. Dickey, General Petroleum Corp.
Z. F. Harshton, Imperial Belting Co.
C. E. Hathaway, Stanley Belt. Co.
C. O. Streeter, Graton & Knight Mfg. Co.
Rubber Association of America.
M. W. Teats, R. & J. Dick Co.
L. V. McAnally, Rossendale-Reddaway Co.
H. P. Wherry, Rossendale-Reddaway Co.
Edwin Vollrath, Victor Balata & Textile Co.

Possible Saving to the Industry

At the end of the year 1925, a survey was made of some 90 representative oil companies to determine the quantities of belting used by them during that year. This survey showed that during 1925, approximately $5,000,000 was spent for belts by the oil industry in the United States alone.

Basing our estimate for the year 1927 in terms of increased field activity, as evidenced by a comparison of production totals for 1925 and 1927, we could safely assume that 6,500,000 will be spent this year. If then, through the use of A. P. I. specifications and recommendations for care and usage, the industry can increase the service of its belting purchases by 25 per cent, it can realize a direct saving of over $1,500,000 per year.

Future Work

The work of standardizing belting is never finished. New ideas involve new work. The most economical product commensurate with service obtainable is the constant goal.

Various engineers at this time are conducting research with the following

Effect of pulleys being out of alignment

Ideal Location

Its ideal location and nation-wide staff of experienced oil news writers located in their respective territories enables readers of The Oil and Gas Journal to know detailed news, facts, and reports weeks ahead of those who depend upon generalized information haphazardly collected and published thousands of miles from activities.

The "Oil Man's Bible" is always first and authentic.

Renew your subscription promptly at expiration so that you will receive every important issue.

The OIL and GAS JOURNAL

TULSA, OKLA.

J. Edward Jones

342 Madison Avenue

New York City

FOR SEVERAL YEARS
a
Constant Purchaser
of
OIL PRODUCING ROYALTIES
in
Oklahoma and Kansas

Banking Connections
and
Field Representatives
throughout the
Mid-Continent

DIVIDEND NOTICE
Imperial Royalties Company

Will pay monthly dividend of 1½% to Preferred Shareholders on September 30. This is Dividend No. 84, and makes a total of 146½% paid to shareholders.

E. S. HORN,
H. O. BLAND,
J. E. HORN, Trustees.
336 Mayo Building, Tulsa, Okla.

OIL MAPS

Panhandle, West Texas, Western Oklahoma, New Mexico

AMARILLO ABSTRACT CO.
Amarillo, Texas

Link-Belt Manufactures A. P. I. Standard Chains

ORIGINAL NO. 1001

American Petroleum Institute

Certificate of Authority To Use Official Monogram

THE AMERICAN PETROLEUM INSTITUTE hereby grants to LINK-BELT COMPANY, INDIANAPOLIS, IND.,

the right to use the following monogram API as specified in official publication of the American Petroleum Institute entitled A. P.I. STDS. NO. 7. First Edition, January, 1927, "A.P.I. Transmission Standards" (chain only),

adopted by the Board of Directors, on June 16, 1926, with the understanding that the use of this monogram is a representation that the material so marked complies with the said specifications, and provided further, that no materials which fail to comply with the said specifications shall be so marked.

The American Petroleum Institute reserves the right to revoke this license to use the above monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

Issued at New York, January 31, 1927.

AMERICAN PETROLEUM INSTITUTE,

M O Boyd Jr

Assistant General Secretary.

API API

The American Petroleum Institute has approved SS-40 and SS-124 as Standard Oil Field Drive Chains and now designate them as follows:

SS-40 and SS-40 Plus—as A. P. I. No. 3
SS-124 and SS-124 Plus—as A. P. I. No. 4

This award is additional recognition of the merit of Link-Belt Chain in the Oil Field

LINK-BELT COMPANY, INDIANAPOLIS, INDIANA

3027

LINK-BELT

Any Steam Pressure (80 lbs. to 200 lbs.) Operates the Type "M-2-S" Rig Lighting Unit

FLUCTUATING steam pressures will not dim your lights with the Pyle-National turbo-generator. It delivers the steady power with close voltage regulation on any steam pressure from 200 lbs. down to 80 lbs. The automatic regulation over such a wide range of pressures means quick lights when starting up the boiler, steady light always.

Send for the "M-2" bulletin and find out why so many experienced operators are enthusiastic about this new unit.

The Pyle-National Company

1334-1358 N. Kostner Avenue, Chicago, Ill., U. S. A.

Direct Factory Representative
C. T. Tewkesbury, 123 E. Jasper St., Tulsa, Okla.

Canadian Agents
The Holden Company, Limited
Montreal, Winnipeg, Vancouver, Toronto

Export Department
International Railway Supply Co.
30 Church Street, New York City

O&GJ9-22-Gray

New
25th Edition

STANDARD OIL BOOKLET

This Booklet contains description of properties, annual reports for 1926, dividend rates, price ranges and other important information relative to this group of companies.

Copy on request

CARL H. PFORZHEIMER & CO.

(Specialists in Standard Oil and Miscellaneous Oil Securities)

25 Broad Street New York, N. Y.

NEW METHODS IN TREATING LIGHT OILS

(Continued from Page 201)

extreme some California refineries having refractory crude mixtures use as much as 2 pounds per barrel, but in such cases as this it is almost always more economical to use acid in advance of clay, as will be described.

The precautions to be taken are that both the clay and the gasoline should be dry. The clay is shipped with a suitable percentage of water in it and should not be further dried, but should be protected against becoming wet, as if it is much damper than the condition in which it is shipped it will absolutely fail to function. The same result will follow if the gasoline contains any water, as in this case the effect of the clay will be simply to remove the water and saturate itself therewith without purifying the gasoline.

It has been observed in a number of cases that where gasoline was produced from a sour crude and was clay treated fresh from the still, it would come to a water white color with a very small dose of clay and back up in color shortly thereafter. In such cases as this, one of two things should be done. Either the gasoline should be stored away 48 hours until it has darkened or at least taken on a slight pinkish shade, after which more clay will be required but the color obtained will be permanent; or the fresh gasoline should be given a very light dose of acid and thereafter treated with clay.

Time of Contact

In some refineries a very short contact time is allowed. This is bad practice, as it increases the consumption of clay and makes the results uncertain. Not less than 15 minutes contact time should be given, and a half hour is preferable, particularly when treating raw gasoline with clay. When an acid dose is given in advance the reaction with clay is more rapid, and 15 minutes is quite sufficient.

Not all gasoline can be purified economically by clay alone. Where gasoline is very dark colored, heavy or otherwise refractory it is much more economical to give it a light acid dose and use clay in place of the caustic and wash water. In this case the gasoline is acid treated in the usual manner either in a continuous set or agitator, according to the equipment available at the plant. The acid treated gasoline should be drawn down and well settled and should then, always and in every case, be transferred to clean apparatus for application of the clay.

The clay is applied to the acid gasoline in exactly the same manner as in the case of its use on raw gasoline. It is simply thoroughly mixed with the gasoline and thereafter filtered out.

The quantity of acid required to bring any gasoline to a certain standard color when acid gasoline is neutralized with clay will be from one-half to two-thirds the dose required to bring it to the same color where a soda wash is used. The quantity of clay required will of course vary with the quantity of acid used, but will be very small in any case. The minimum dose is that in which the acidity of the gasoline to alkaline Phenolphthalein solution just disappears.

The removal of the clay from the gasoline should always be accomplished by means of a filter press. Because of the very small quantity of the clay used and the extreme fluidity of gasoline the press capacity required is small. The Sweetland press is recommended for this purpose and the Sweetland people have had ample experience from which to recommend the proper size press for any installation. Where clay alone is used it is desirable to use the ordinary cotton cloths such as Parma twill. Where acid is applied ahead of the clay some operators prefer to use woolen cloths or to use a Monel metal cloth and precoat with some such material as Filtercel. The requirement for the use of acid resistant cloth should not exist. It arises from failure to allow sufficient time for the clay to absorb the acid removed from the gasoline.

Treating Kerosene

Clay may be used to purify kerosene in the two ways indicated above for the purification of gasoline, though it should be said that it very seldom occurs that the raw kerosene is sufficiently pure to make it economical to use clay alone. With a very sweet crude and a kerosene cut almost water white, the color may be brought up to 25 Saybolt and the odor sweetened by the application of anywhere from one-half to 2 pounds of clay per barrel. In most cases, however, the kerosene requires acid treatment, or can be more economically handled in this manner than by using clay alone. Pressure distillate treatment is similar to that for kerosene.

Clay used in connection with acid simply replaces the soda and water wash and consequently the acid is applied in the usual manner. Great care should be taken that the acid treated kerosene is completely free from tar, as otherwise the color will not be stable. If any difficulty occurs in settling the kerosene, or if it is very blue, clear it up with a small preliminary dose of raw clay, or of spent clay (filter cake) mixed up with enough kerosene to break it. This preliminary dose may be settled and drawn, after which the balance of the dose (raw clay) is given.

The clay is applied to the acid kerosene in the same manner as to acid gasoline, and filtered out in the same way. The minimum quantity of clay required is that which will produce perfectly neutral kerosene following the acid dose required to obtain the burning properties and sweetness which are standard for the particular grade of kerosene being made. Obviously both the acid dose and the clay dose will vary over wide ranges and must be determined by experience in any particular case.

There are two very material advantages in the use of clay for neutralizing kerosene over neutralization with caustic followed by water washing. The first is that a considerably smaller proportion of acid may be used on account of there being no backup in color during the neutralization stage and because of the fact that the clay itself has a very considerably purifying action. The second advantage is that as the removal of acidity is mechanical rather than chemical, no water soluble salts will form and wick incrustations are avoided. Any required reduction in sulphur content must be produced by the acid or other means, as the clay will not appreciably reduce the sulphur. It will, however, take up at least part of the heavy ends which affect the burning properties, and in that case a much better burning oil may be had with clay than can be had with a corresponding acid and soda treatment.

Hypochlorite Treating

A doctor sweet gasoline and one having good color may be obtained by the use of chlorin. This method is popular for the treating of natural gasoline and is used to some extent for sweetening the higher gravity refinery gasolines. Chlorin is a gas under ordinary conditions, but it should not be used in the pure state because it will combine with some hydrocarbons to form powerful explosive substances. It is safely and conveniently used in the form known as hypochlorite.

Compounds of either sodium or calcium (lime) and chlorin when combined in certain proportions are known as hypochlorites and their value in the petroleum industry depend upon the quantity of chlorin present. The hypochlorites are oxidizing agents. They oxidize the sulphur compounds in the oil to other compounds which are free from odor and color; these may be removed from the unfinished product by contact with water and alkali, because they are soluble in these substances. There are some substances which are not soluble under the existing conditions and these cannot be removed. There are several groups of sulphur compounds known to be present in petroleum products.

The mercaptans, compounds which contain the sulphur and hydrogen group, have a bad odor, produce color, are present in most oils containing sulphur. They are oxidized by the hypochlorites to sulphonic acids, which are soluble in both water and caustic soda. There are other sulphur compounds which have complicated and unknown composition. These

Drilling the World's Deepest Oil Well

IT takes courage and perseverance to drill over 8,000 feet for oil. And it takes more than ordinary steels to stand the gaff of such deep drilling. That's why Agathon Alloy Steels were used. They wear rock while the roughnecks wear smiles, no matter how deep the drilling job. The success of the Midway Oil Company in drilling their famous Olinda 96 well was in a large measure due to the Agathon Alloy Steels used in bits and drilling equipment. If they'll chew their way a mile and a half into the ground, think how these super-drills would stand up under the severest drilling operations you have.

Got a copy of our Agathon Alloy Steel Handbook?

Mid-Continent Office:
406 W. First Street
Tulsa, Oklahoma

AGATHON STEELS

Central Alloy Steel Corporation, Massillon, Ohio

World's Largest and Most Highly Specialized Alloy Steel Producers

Makers of Toncan Copper Mo-lyb-den-um Iron

Cleveland Syracuse San Francisco Detroit Philadelphia Chicago Los Angeles New York Tulsa St. Louis Seattle Cincinnati

AGATHON ALLOY STEELS

Francis, Bro. & Co.

—ESTABLISHED 1877—

214-218 N. 4th Street
ST. LOUIS, MO.

Kennedy Building
TULSA, OKLA.

Members

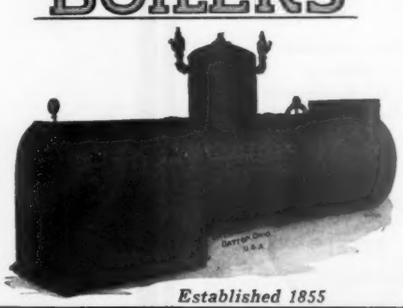
NEW YORK STOCK EXCHANGE
NEW YORK CURB MARKET
CHICAGO STOCK EXCHANGE
ST. LOUIS STOCK EXCHANGE

Securities of the Petroleum Companies

BOUGHT—SOLD—QUOTED

Kennedy Building, Tulsa, Oklahoma
Telephone 2-3116

BROWNELL
High-Pressure
Oil Country, ASME
BOILERS



Established 1855

BOILER VALUES

are determined by design, workmanship, strength, economy and durability. Brownell Oil Country Boilers embody these essentials.

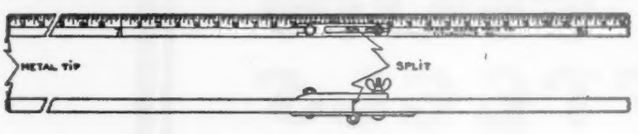
Domestic Distr. Dunigan Tool & Supply Co., Breckenridge, Texas

Export Division, Oil Field Machinery Co., 90 West St., New York, N. Y.

Get bulletin B-7
THE BROWNELL COMPANY
Dayton, Ohio, U.S.A.

GAUGE POLES

Any Length — For Oil Measurements



"MARSH-JOINT"

For sale by oil country supply houses or furnished promptly by the factory at Titusville, Pa.

Correspondence Solicited

MARSH GAUGE POLE COMPANY
TITUSVILLE, PA.

oxidize to unknown substances. However, it is known that members of this group having low molecular weight are soluble and those having high molecular weight, like those found in kerosene, are insoluble. Treatment with hypochlorite then is confined to the lighter fractions, or to those containing sulphur compounds which may be rendered soluble in the presence of the hypochlorite or in the subsequent washings with caustic soda and water.

Typical Procedure

One form of the treatment may be outlined:

1. Initial water wash. 2. Initial caustic soda wash. 3. Water wash. 4. First hypochlorite wash. 5. Second hypochlorite wash. 6. Final soda wash. 7. Water wash. The contact with caustic soda and water is an essential part of the treatment, otherwise the secondary products cannot be removed and consequently there may be overchlorination and contamination of the gasoline.

The hypochlorite has no action on free sulphur, consequently this element cannot be removed from petroleum products by this process. If hydrogen sulphide is present, the action of the chlorin will cause sulphur to be set free. When free sulphur, or hydrogen sulphide, is present the material to be treated should be first washed with water and caustic soda.

The question of convenience and expense is usually the determining factor when selecting caustic soda or lime as the chlorin carrier. Under some conditions caustic soda may be obtained with more convenience than lime, but under other conditions lime may be abundant and obtained at less cost.

Ease of solution and control conditions are points in favor of the caustic soda. The quantity of chlorin should be very close to a 0.3 normal solution and the quantity of free alkali between 0.5 to 1.0 grams per liter. If there is too little free alkali in the solution there will be a tendency to decomposition and the matter of control so difficult that the process becomes dangerous when applied on an industrial scale. An excess of alkali appears to slow down the reaction.

The bulk and low rate of solution are objections to lime. On a basis of equal activity the quantity of lime necessary is less than required by the caustic soda solution.

The method for making the hydrochlorite solutions follow: Calcium hypochlorite may be made by passing chlorin, from a cylinder containing liquid chlorin, into milk of lime until a clear solution is obtained. This solution will have a strength of about 2.5 normal and must be diluted with water eight times before use. This will give a solution equivalent to 0.3 normal and has the same value as the sodium hypochlorite solution. Some treating may be done with the solution made from the commercial bleaching powder by agitating it with water, but this practice is too expensive except on a very small scale. Milk of lime is made by mixing lime and water in the proportions of 25 pounds of lime to 225 gallons of water. Hydrated lime may be poured into the water and the mixture stirred or circulated through a pump.

Vapor Phase Treating

The so-called vapor phase treating of light oils is constantly growing in importance. Probably every reader is familiar with the main features of this method of treating, as the owners of the process have been active in bringing it to the attention of plant operators. The process briefly described consists in the treatment of the light oils while still in the vapor phase through contact with fuller's earth.

Through this method of contacting, it is claimed that only the objectionable hydrocarbons are removed without the volume losses which accompany the sulphuric acid treatment. Its widest use has been in the treating of cracked distillates direct from the cracking operation.

NEW PRINCIPLE IN CONTACT FILTRATION

(Continued from Page 210)

when the solution is removed from the solid adsorbent, more of the soluble impurities will remain attached to the adsorbent and be removed from the oil."

The accompanying figure shows the drawing that is a part of this issued patent No. 1,636,938. This drawing is self-explanatory as to the process by which the invention can be carried out.

Six Claims

Six claims were allowed the inventors, three of which are given below:

1. An improved process of decolorizing, clarifying and purifying petroleum oils which consists in mixing the oil by any suitable means with untreated, finely-divided clays containing enough water to form a viscous, cohesive mass sufficiently fluid to be pumped through pipes, passing the mixture through a suitable heating device without heating the mixture to a temperature in excess of the boiling point of the oil being treated, then steaming down the hot oil and clay mixture to a temperature somewhat in excess of the boiling point of water and drawing off the vapors with the spent steam, further cooling the mixture to the desired temperature for separating the spent filtering material from the oil and separating the spent filtering material from the oil.

5. The herein described method of decolorizing and purifying petroleum oils which consists of mixing the oil to be treated with a viscous mass of finely-divided, untreated clay and water in the presence of zinc chloride and thereafter heating the mixture to a point in excess of the boiling point of water.

6. "The herein described step in decolorizing and purifying petroleum oils which consists of intermixing the oil to be treated with a filtering material consisting of water and finely-divided, untreated clay in the proportion of 30 per cent to 500 per cent by weight of water to clay and zinc chloride as a catalytic material.

Catalytic Agent

Claim 2 is similar to Claim 1, but includes the use of "untreated, finely-divided clays containing zinc chloride as a catalytic agent.

Claim 3 is similar to Claim 1, but specifies the use of "untreated, finely-divided clays containing from 30 per cent to 500 per cent by weight of water to clay" instead of "untreated, finely-divided clays containing enough water to form a viscous, cohesive mass sufficiently fluid to be pumped through pipes," as mentioned in Claim 1.

Claim 4 is similar to Claim 3, but includes the use of "zinc chloride as a catalytic agent" added to the "untreated, finely-divided clay containing from 30 per cent to 500 per cent by weight of water."

"Shop rights" on this patent have been licensed to Producers and Refiners Corp., main offices of which are at Denver, Colo.

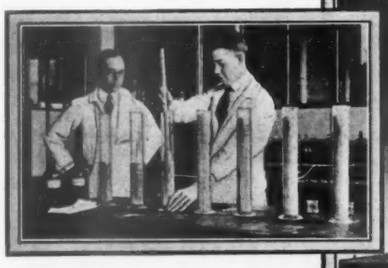
H. L. Kauffman, one of the inventors, is a petroleum consultant with offices at 610 Midland Savings Building, Denver, Colo.; while I. A. Clark, the co-inventor, is a research chemist for the Mid-Continent Petroleum Corp., Tulsa, Okla. Several other patents of these same men relative to contact filtration, have also been licensed by Producers & Refiners Corp.

PERFECT NEW METHOD TO REMOVE COKE

(Continued from Page 206)

at the Parco plant, the coke is dropped through an opening in the cone-shaped bottom of the bin into the coke cars of the refinery's industrial railway system. The bottom of this storage bin is perforated to allow the removal of any water that may have been conveyed to the bin with the coke. During the "cleaning out" of a reaction chamber, water is usually introduced into the chamber to prevent flashing, as a result of which the coke is wet when it reaches the storage bin.

From the temporary storage bin the coke is transferred in the side-dumping type of industrial railway cars to a permanent storage point (in the open) located about 1,000 yards from the cracking units.



In the Foamite-Childs laboratories chemical engineers are constantly working to still further perfect Foamite *Equipment*

"Home-made" foam systems, workable in theory, have failed in a fire crisis!

Through Foamite *Mixing Chambers of correct proportions, a properly installed, properly maintained* Foamite *System will quickly control the worst tank fire under a thick, heat-resisting blanket of Firefoam. Ten years of specialized oil-fire engineering lie behind this success*

Five kinds of specialized engineering service • •

As essential to the success of the Foamite *System as the foam principle itself*

KILLING oil fires with a foam system involves many problems which cannot be solved by a general knowledge of engineering alone—nor by knowledge of oil alone.

The standard *Foamite* System performs dependably because it is the time-tested, practical achievement of five groups of engineers whose technical training is wholly applied to this one highly specialized field. These groups comprise:

Designing engineers for the proper proportioning of the System—

Installation engineers for supervising efficient erection—

Inspection engineers for supervising successful maintenance—

Chemical engineers for the periodic analysis of chemical solutions—

Development engineers for keeping the System abreast of the latest discoveries in *Foamite* Protection.

With this complete service behind it, the *Foamite* System has *never* failed. On the other hand, "home-made" foam systems have failed.

Our representatives, located at points convenient to all principal oil producing and refining centers, will be glad to make preliminary surveys of your fire hazards—gratis.

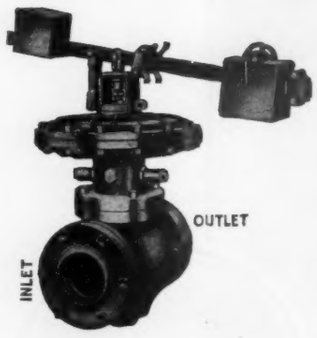
Foamite-Childs Corporation, Fire Protection Engineers and Manufacturers, 169 Turner Street, Utica, N. Y. *Foamite-Childs of Canada, Ltd., Toronto, Ont.*

Foamite-Childs Protection

A Complete Engineering Service

Against Fire

Differential Gas-Relief Valve



When measuring gas with orifice meters, the Fulton Differential Gas Relief Valve, automatically turns them on and off, in conformity with the changes of flow. Gas companies which have not yet studied its operation are invited to write for descriptive catalogue, today.

CHAPLIN-FULTON MFG. CO.
28-36 Penn Ave., Pittsburgh, Pa.

64

McGREGOR

"The Working Barrel That Works"

Over sixty thousand now in use from Pennsylvania to Argentine and from Oklahoma to India wherever oil is produced.

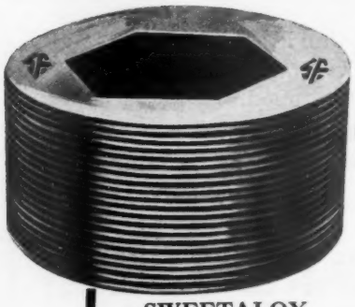
No Barrel can compete with the McGregor in price and saving. It comes with the barrels, valves, valve stem all complete at a price slightly more than what the old style Barrel would cost. Pumps as fast as old style barrels that are attached to the tubing.

The only pulling done when you have a McGregor in use is the rods as the complete Barrel is fastened to the rods and comes out when they are pulled. TUBING PULLING is done away with as far as the Working Barrel is concerned. Made for all size tubing. Use "Mac" Ball and Seat.

See your dealer or write us for circular

In ordering parts refer to these letters

McGREGOR WORKING BARREL CO., Inc.
Sole Manufacturers
BRADFORD, PENNA.



SWEETALOY

A NEW STILL PLUG!

Because WE know what Sweetaloy (nickel-chrome-iron) Still Plugs will do, and because we wish YOU to know, we will equip one of your units COMPLETE with Sweetaloy Still Plugs.

GUARANTEED FOR ONE YEAR

Shipments immediately from stock. Write for more information regarding the PERFECT Still Plug, for use under all conditions.

WM. J. SWEET FOUNDRY CO.
IRVINGTON, N. J.

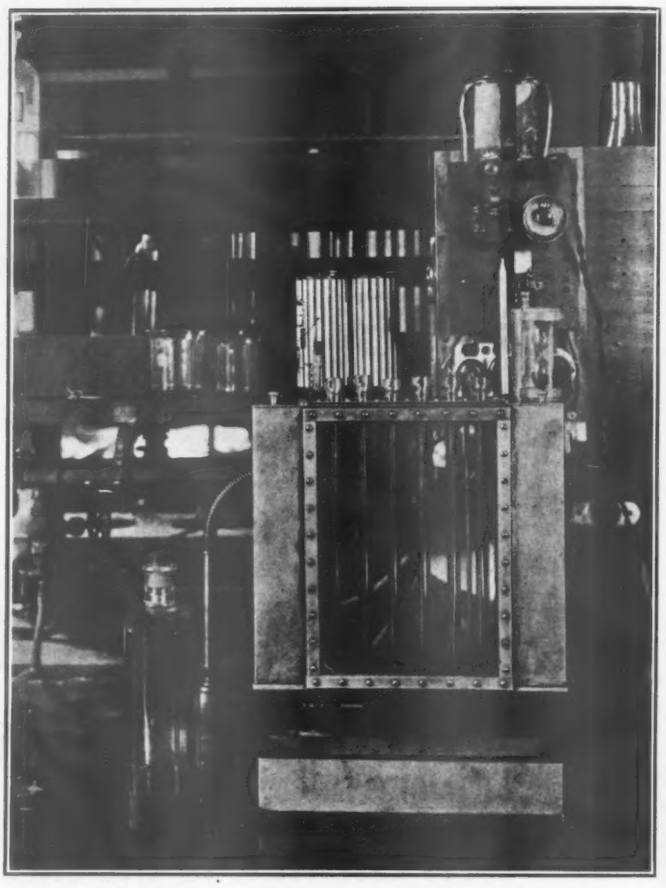
LABORATORY APPARATUS

(Continued from Page 213)

cedure for other laboratories. For these performed equally well by commercial services a fee is charged which is estimated to cover the cost of the work performed.

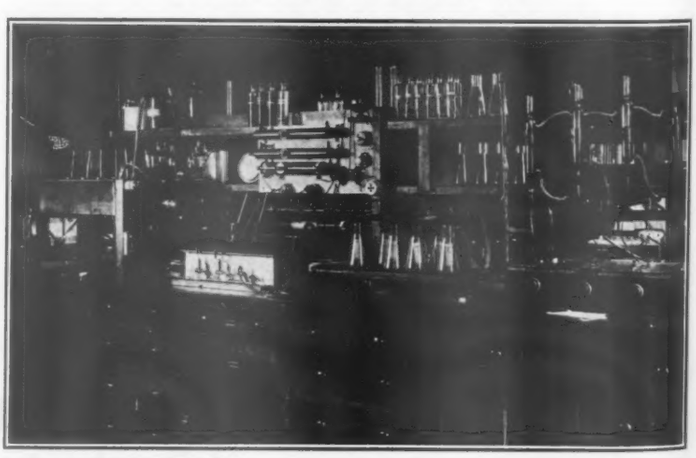
Testing for private individuals is not done in cases where such testing may be

KENNEDY VISCOMPARATOR



This instrument is built for the rapid and accurate determination of viscosity of lubricating oil. The tubes numbered at the top, 1, 2, 3, 4, 5, and 6, are graduated in Saybolt seconds, and are surrounded by a bath thermostated at the temperature of test. Each tube is provided with an overflow tube at the top, and capillary tube at the bottom. The graduation lines are so placed that the surface of any liquid will reach the mark corresponding to its viscosity when allowed to flow through the capillary for the same length of time. An oil of known viscosity is placed in one of the tubes and oils whose viscosity is to be determined are placed in the other five tubes. The overflow tubes assure a constant initial level for the oils in the various tubes. After waiting sufficient time for the oils to come to constant level in the tubes and for the temperature of the oil to reach the temperature of the bath, the stops at the bottom of the tubes are lowered simultaneously and the oils from the various tubes flow into the pan beneath them. When the surface of the oil of known viscosity contained in one of the tubes reaches the mark corresponding to its viscosity, the stops are raised and this discontinues the flow of oil from all of the tubes. The viscosity of the oils are then read on the scale etched on the tubes. The temperature of test makes only minor differences for several degrees range, thus making an accurate temperature control unnecessary. Prior to the adoption of this instrument only one sample was tested at a time with the Saybolt Viscosimeter.

FUEL TESTING APPARATUS



Viscosity test run for Saybolt fuel instrument. Four samples can be run through this instrument simultaneously. Temperature 50 degrees Centigrade. Instrument consists of four Saybolt Furol tubes set in thermostat bath at 50 degrees Centigrade. Flash point tester (Pensky-Martens). Two determinations are made simultaneously with this instrument. Apparatus for determining sediment. Eight determinations are made simultaneously. Apparatus for determining water in fuel oil and other products. Four determinations are made simultaneously. The apparatus is so arranged that one man can perform 8-12 complete tests per day.

The Foxboro Automatic Volume Controller

Foxboro Controlled Gas Lift Means Greater Oil Production

Gas Lift is the modern method of stimulating oil production. But the flow of air or gas to the well must be automatically controlled to get the best results.

The Foxboro Automatic Volume Controller:

Properly proportions the volume of gas or air to the wells;

Permits the manifolding of gas compressors into a single large header.

Enables wells to operate continuously at a predetermined rate;

Saves the services of men who otherwise would put all their time on this job;

Gives an infallible daily record of control of gas going to the wells.

It is a combination of proved principles used in Foxboro Standard Instruments for more than ten years.

This instrument is also being used to control the rate of flow of oil to pipe stills. It balances the whole operation. One Oil Company estimates a saving of $10,000 a year from the use of one instrument alone.

The Foxboro Co., Inc.

Neponset Avenue, Foxboro, Mass., U. S. A.

205 So. Cheyenne Ave., Tulsa, Okla.

NEW YORK CHICAGO BOSTON PHILADELPHIA LOS ANGELES SAN FRANCISCO
PITTSBURGH CLEVELAND ROCHESTER ATLANTA DETROIT PORTLAND, ORE.

FOXBORO

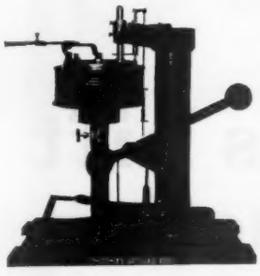
REG. U. S. PAT. OFF.

THE COMPASS OF INDUSTRY

Instruments for Indicating, Recording and Controlling Temperature, Pressure, Humidity and Flow

Gott Water Can
Gottkool
Built to last—you will always be assured of a fresh supply of pure water, when you have a GOTT. Made in 1½, 3, 5 and 10 gallon sizes. Order now from your supply store.
H. P. GOTT MFG. CO.
Winfield, Kansas
Gott
WATER CAN

Tested 225 Fittings in One Hour



That's the remarkable record of the

UNIVERSAL PIPE FITTINGS TESTING MACHINE

in a recent test on ¾" ells. The Universal is not only quick but it is thorough and sure in bringing out the serious defects in Meter Swivels, Pipe Saddles, Reducing Couplings, Straight and Angle Valves, Tees, Ells, Crosses and Stop Cocks.

When you consider that from 30% to 96% of pipe fittings have been found defective, the need for the Universal is readily seen. Some of the biggest users of fittings on the West coast now use and praise the Universal

**Put a card in the mail today asking for detailed information about the Universal.*

Fernholtz Machinery Company

"Leaders Since 1883"

2053 East 38th St., Los Angeles, California

Pacific Coast Representative for W. A. Riddell Company, Successors to Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Crossley Machine Co., Trenton, N. J.

"Central" Oil Country Tubular Goods

Large gas companies, after using "Central" Pipe, have commented upon its uniform lengths, perfect roundness, and careful beveling. These sterling qualities in "Central" reduce construction costs by speeding up the field work and, in addition, insure a tight durable line.
For complete satisfaction all around use "Central" Pipe on your next job.

CENTRAL TUBE COMPANY

General Offices—First National Bank Bldg.
PITTSBURGH

Representatives in the Oil Fields
Mid-Continent: Allen, Sproull & Allen, Burk Burnett Bldg., Fort Worth, Texas
California: E. C. Saul, Monadnock Bldg., San Francisco, California.

DISTRIBUTORS: Taubman Supply Corporation, Tulsa, Oklahoma, and branches; Dunigan Tool & Supply Co., Breckenridge, Texas, and branches; Putnam Supply Company, Putnam, Texas, and branches; Louisiana Iron & Supply Co., Shreveport, La., and branches; Petroleum Equipment Co., Los Angeles, California, and branches; American Supply Co., Mexia, Texas; Standard Supply Co., Inc., Wichita Falls, Texas.

laboratories. Only such tests are performed in referee or standardization tests which have been standardized to give reproducible results. Between 2,000 and 3,000 samples of petroleum products are tested annually at the bureau's laboratory.

New Methods of Instruments

A less direct service but one of great value to the public is the development of new test methods and instruments. Among those recently developed is an oxidation method for determining the deterioration of lubricating oils when exposed to high temperatures. This method was developed by T. S. Sligh who also perfected the apparatus and procedure for determining the amount of dilution in crankcase oils.

The Kennedy Viscomparator and Sulphur Lamp also have been valuable contributions in this field.

The laboratory is also interested in making up specifications for the products indicated in the foregoing. The final decisions in respect to the form in which these specifications are made rests with a technical committee on lubricants and liquid fuels of the Federal Specifications Board.

The accompanying views of the petroleum products laboratory of the Bureau of Standards were taken especially for The Oil and Gas Journal. With the descriptions which accompany them the views give the reader an insight into the work of the laboratory and the apparatus used.

MANY NEW TYPES OF TANKS FOR REFINERIES

(Continued from Page 205)

soon becomes discolored and the yard gets muddy if there are not adequate drains.

New Development

A new development in tank roofs has been announced by a manufacturer in what is known as a flexible roof. It is applicable to field or refinery storage tanks of large size where the tanks remain full over a long period. The top of the tank works as a steel diaphram, taking an umbrella shape as pressure is developed in the tank and then falls on the frame work below the tank rim as the pressure is decreased. Relief valves for pressure and vacuum do not allow the top to be torn from the sides which are welded to the tank to form a vapor tight seal. This new development is being tried on an 80,000-bbl. tank filled with crude oil at Seminole. This principle is similar to that of the breather bags and as these have shown very good results in practice it is probable that similar results will be found in the use of this breather roof.

MANY FUTURE SOURCES OF MOTOR FUELS

(Continued from Page 202)

ilarly, other waste vegetable matter may be treated to produce tars for cracking purposes.

Other Fuels

Fischer and Tropsch[6] succeeded in obtaining a mixture of hydrocarbons corresponding to a synthetic petroleum by passing a mixture of carbon monoxide and hydrogen over a catalyst at substantially atmospheric pressure and an average temperature of 270 degrees Centigrade. The carbon monoxide and hydrogen may be produced by the water gas reaction from coal and steam.

It is stated that a yield of approximately 50 per cent of hydrocarbons ranging from methane to solid paraffin waxes can be obtained by this process. An absolute yield of 100 grams of solid and liquid hydrocarbons and easily liquefiable hydrocarbons for each cubic meter of water gas has been obtained. The best catalyst was found to be iron or cobalt mixed with oxides, such as zinc and chromium, or the rare earths. The simple iron catalyst was used with good results. By purifying the water gas before treatment, the resulting hydrocarbon products required no refining.

This process, while still in the laboratory stage, shows commercial possibilities for the future, due to the enormous quantities of coal and water available.

Carbon Monoxide and Hydrogen

Fischer and Tropsch converted carbon monoxide and hydrogen under high pressure, with an excess of hydrogen present, into a mixture suitable for motor fuel, consisting of the higher alcohols, ketones and aldehydes. The catalyst used was alkalized iron, the products differing in composition as the alkali was changed. In general, the stronger bases produce compounds of higher molecular weight. The product resulting from this process is referred to as "synthol."

The process has excellent prospects for the future production of motor fuels, especially for blending purposes.

Production of Methyl Alcohol

The Badische Anilin and Soda Fabrik have for several years been producing methyl alcohol by passing a mixture of hydrogen and carbon monoxide over catalysts under high pressures.

Patart, who described his experiments before the International Conference on Bituminous Coal at Pittsburgh on November 16, 1926, succeeded in making methyl alcohol by passing hydrogen and carbon monoxide over a zinc oxide catalyst at pressures exceeding 130 atmospheres and temperatures below 400 degrees Centigrade.

Dumanois, whose paper was also delivered before the International Conference on Bituminous Coal, made a series of motor tests, using methyl alcohol as a fuel, and indicated a saving of 15 per cent over gasoline.

The merits of methyl alcohol (wood alcohol) as a motor fuel, owing to the many methods for producing it, warrants further investigation. Wood alcohol, although of low heating value, is highly volatile, but on the other hand there are some objections to its use, including its very poisonous nature.

Carbon Dioxide and Hydrogen

In the past, the carbon dioxide and hydrogen produced during the fermentation of corn were largely waste products. The Commercial Solvents Corp. has worked out a commercial process for producing methyl alcohol from carbon dioxide and hydrogen in the presence of a catalyst. This company is producing methyl alcohol commercially. The methyl alcohol can be used as a blending agent with gasoline producing a high antiknock motor fuel. However, it must be recognized that methyl alcohol is a poisonous material not alone taken as a "beverage" but also its vapor.

Bergius Process

Doctor Bergius described his process before the International Conference on Bituminous Coal on November 15, 1926. The Bergius process for the direct conversion of coal into hydrocarbon liquids consists in mixing pulverized coal with oil or tar to form a thick paste and feeding the latter continuously into the conversion system at an average temperature of 450 degrees Centigrade, and an average pressure of 200 atmospheres. An atmosphere of hydrogen is maintained constantly in the apparatus at the given pressure. The reaction is considered one of direct hydrogenation of carbonaceous matter to form liquid hydrocarbons. A small percentage of iron oxide is added for the purpose of removing sulphur compounds. A conversion of 50 per cent of the coal into hydrocarbon oils and tars is claimed.

Fieldner and Brown[7] show the following yields of products recovered from the crude tar produced by the process. A yield of 140 gallons of liquid was obtained for each metric ton of coal treated. The products resulting were:

Motor fuel, 40 gallons.
Diesel engine oil, 50 gallons.
Fuel or creosoting oil, 35 gallons.
Uncondensable gas and a pitch residue, 1,000-1,200 cubic feet.

The yield of gasoline was approximately 10 per cent by weight of the coal (an average of 34 gallons per short ton).

This process is, as yet, undeveloped from a strictly commercial viewpoint, and while marvelous technical achievements have resulted in connection with

[6]Fischer and Tropsch: Ber. 59, 830, 832, 923 (1926).

[7]Fieldner and Brown: J. Ind. Eng. Chem., Vol. 18, p. 1,013 (1926).

ANTI-CARBON

SHELL MOTOR OIL

Shell Quality Controlled

Special Refining Process

The Year-Round Oil

Smooth Tough Film

Golden Clear Color

Made From Selected Crudes

Made from Selected Crudes

Crudes used for the refining of Shell Motor Oil are deliberately selected . . . from the hundreds of Shell-controlled oil wells . . . for their high natural lubricating properties. Right at the start appears the evidence of Shell quality . . . painstakingly established and jealously maintained.

A Two-fold Advantage

Under any label, Shell Motor Oil would be a winner. Backed up by the prestige and popularity of the Shell name, it has a doubly powerful meaning to the jobber or dealer who seeks to build up a permanently profitable motor oil business.

Your inquiry regarding Shell Motor Oil and open franchises is invited

ROXANA PETROLEUM CORPORATION
SHELL BUILDING ✓ ✓ *SHELL CORNER* ✓ ✓ SAINT LOUIS

The Shell Refinery at East Chicago, Indiana

RYERSON

IMMEDIATE SHIPMENT FROM STOCK

Bars, Plates, Rivets, Tool Steel, Shapes, Sheets, Bolts, Welding Rods, Structurals, Tubes, Wire, Concrete Reinforcing, Rails, Pipe, Turnbuckles, Alloy Steel, Ascoloy, Small Tool, Machine Tools, etc.

Write for the Ryerson Journal and Stock List.

JOSEPH T. RYERSON & SON INC.

Chicago Milwaukee St. Louis Cincinnati Cleveland
Detroit Buffalo New York Boston

Tulsa Office: 410 Atlas Life Bldg.

STEEL

Houston Office: D. S. Mair 220 Main Street

MYERS SELF-OILING BULLDOZER POWER PUMPS AND WATER SYSTEMS

In the East—in the West—in the North—in the South—Myers Self-Oiling Bulldozer Power Pumps and Water Systems are demonstrating through thousands and thousands of installations their superiority for dependable, economical and long-time service. There is a style and size for every purpose. Tell us of your water problems—we will be glad to help you solve them. Write us direct, or ask your jobber or supply house for catalog and information.

THE F. E. MYERS & BRO. CO. Ashland, Ohio
ASHLAND PUMP AND HAY TOOL WORKS

Ajax Bull Ropes

"Strength in Every Length"

AJAX ROPE COMPANY, INC.
SINGER BUILDING ANNEX
96-97 LIBERTY STREET
NEW YORK

Mid-Continent Sales Distributors:
Bisett & Brown
1007 Jones Street
Fort Worth, Texas

Warehouse Representative:
H. D. Hedrick
Tulsa Transfer & Storage Co.
Tulsa, Okla.

Ajax ropes are carried in stock by the North Texas Supply Co., Cross Plains, Tex.; Rex Supply Co., Sour Lake, Tex., and Mid-Continent Supply Co., Fort Worth, Tex.

JOIN THIS GROUP

The Men who are making the GREATEST SUCCESS in the Oil Business read The Oil and Gas Journal every week. Let Uncle Sam deliver it to you regularly. Send This Coupon Now.

Beginning AT ONCE send a copy of The Oil and Gas Journal to me every week.

Name .....

Address .....

City..... State.....

Six Dollars a Year

STEEL PLATE CONSTRUCTION

Steel Oil Storage Tanks, Condensers, Stills, Refinery equipment of every kind, Fabricated and Erected

RITER-CONLEY COMPANY

General Offices—Pittsburgh, Pa.

it, there are many difficulties still to be overcome in large scale operation. Doctor Bergius stated that it took several years alone to develop pumps, valves, etc., for continuously feeding the pasty mixtures and continuously withdrawing the unconverted portion together with the ash. There is much wear and tear upon the pumps and valves such as results from the feeding of a gritty mixture under pressure. The indirect method of heating by an inert gas passed between the double walls of the converter, and maintaining the heating medium at approximately the same pressure as exists in the inside of the converter are signal achievements in operating the process. The extremely high pressure used necessitates remote and isolated control, which may at times be quite disadvantageous from a practical viewpoint.

Utilization of Heavy Oils

The direct utilization of heavy oils or tars for internal combustion engines has been accomplished in engines of the Diesel type, but at the present time it is cheaper to crack and produce a motor fuel suitable for automobile motors, as there are many disadvantages and difficulties to overcome in applying heavy oil-burning engines to motor cars.

Solid Fuels

W. E. Trent also delivered a paper before the International Coal Conference showing the use of powdered coal as a fuel for internal combustion engine. He asserted that powdered coal could compete with gasoline at 6 cents per gallon. This is a development which will require more investigative work and demonstration before any judgment can be passed upon its possibilities.

As a matter of interest, experiments have been reported using flour dust as a motor fuel in operating a Ford car. Lycopodium, wood flour and similar combustibles may be also used.

Producer Gas

A great deal of work has been done on the use of charcoal as a source of producer gas for internal combustion engines adaptable to automobiles. The charcoal container is carried upon the vehicle. This development has interesting possibilities, and will no doubt be used to some extent in the future.

Coal Gas and Acetylene

During the war balloons were used as storage for the combustible coal gas, hydrogen and acetylene in connection with motor bus operation. The combustible gases were passed in regulated quantities to the motor and operated it reasonably satisfactorily.

Motor and Electric Drive

Some tests have been made in motor buses, using a gasoline engine, electric generator and motor. The gasoline engine is started on gasoline and then a gas oil fuel is used to generate electrical energy to operate the bus. This system has the advantage of using cheap fuel and ease of operation owing to elimination of gear shifting.

Motor Improvements

It has been calculated that only 5 per cent of the heat energy content of motor fuels are utilized by the motor. To raise this to 10 per cent would double the energy output, reflecting itself in doubled mileage. One of the reasons for this poor efficiency is the limitation upon the compression pressure at which the motor can operate because of the tendency of certain types of motor fuels to detonate when operated at high compression pressures, or high compression ratios.

The compression ratio of the average present-day motor car is only a little over four to one, and increasing this compression ratio to six points five to one practically doubles the power output and the mileage.

Knocking in a motor is evidenced by a pinging noise, which sounds very much like two metallic parts striking together. The simplest explanation of this phenomenon and the one which is commonly accepted is that the knocking or detonation is caused by the auto ignition of a portion of the charge, which has been compressed by the wave front of that part of the unburned portion to the point where it ignites. This unburned portion, owing to the increased temperature and pressure, explodes violently and suddenly, and results in knocking.

The rapid development of heat when the motor knocks increases the temperature within the cylinder still further, resulting in a hot engine, and a continuation of this condition will increase the temperature to that stage where the points on the spark plug are raised in temperature sufficiently to cause preignition which disturbs the whole motor equilibrium. In order to offset this condition, the excess heat must be removed by the cooling water, thus causing a waste of energy and resulting at the same time in a waste of motor fuel. Under proper burning conditions, this will not take place.

All hydrocarbon motor fuels have practically the same energy content under nondetonating conditions from a theoretical and experimental basis; however, practically they act quite differently under working conditions in a motor for the reasons stated above.

Knocking is observed usually when accelerating from low speed, in climbing hills, and when carbon has accumulated in the cylinder. All of these fall within the regular operating conditions of a motor car. In hill climbing, the knocking condition is usually avoided by shifting from high to low gear. This calls for an increase in power consumption and it is therefore desirable that such shifting be avoided when possible.

Knocking may be eliminated by the addition of antiknock substances, such as tetra-ethyl lead, aniline, alcohols, and benzol. Some claims have been made for the value of iron carbonyl produced by the Badische Anilin and Soda Fabrik. Some objections have been raised in regard to the use of both the lead and the iron compounds.

Conservation by Cracking

The course which the future production of motor fuel is taking, by way of the cracking process, is at the same time leading to the production of motor fuels of increasing antiknock properties. The increasing proportion of cracked gasoline as compared with straightrun gasoline is causing and will cause in the future an increasing proportion of gasoline of the desirable antiknock components, namely the aromatic hydrocarbons, the unsaturated hyrdocarbons, and the naphthene hydrocarbons.

When the average motor fuel of the future is composed of gasoline from the cracking of petroleum, shale oils, low-temperature coal tars, lignite, peat, and wood tars, without doubt the high compression motor will have come into general use with the resulting greatly increased efficiency, mileage and economy.

The time is not far distant when the increasing proportion of cracked distillates to straightrun gasoline resulting from the necessarily increased cracking of petroleum will produce an average motor fuel for market consumption which will operate high compression motors with the aforementioned results.

Unnecessary Specifications

The requirements for good motor fuel are: (1) ease of starting, which depends upon the vaporization of the low-boiling constituents amounting to approximately 20 per cent of the motor fuel; and (2) thermal efficiency, which is limited by the tendency to knock at high pressures.

The present minimum requirements of absence of color, sweet odor, and stability under marketing conditions, including in a majority of the cases the meeting of certain specifications, such as the doctor test and the corrosion test, as well as an arbitrary requirement for sulphur content, could be modified to effect tremendous reductions in treating losses, increase in motor fuel quality and lowered refining costs. Aside from volatilization and thermal efficiency, which includes the antiknock properties, it would seem that the only factor which should be considered in motor fuel refining is the production of a product the odor of which is unobjectionable and which is stable, i.e., which does not deposit tars or gummy materials in storage.

For motor fuels containing sulphur, a tremendous economic saving would be effected by the fixing of proper limits upon the sulphur content; for example,

STANDARDIZATION

The Industry is coming to—

and to—

American Roller Bearing Company
Pittsburgh, Penna.

Ask these manufacturers why they are not only keeping in step but are leading the way by their adoption of the roller bearing that has the requisites for successful *standardization.*

These, and other, authorities can tell you—

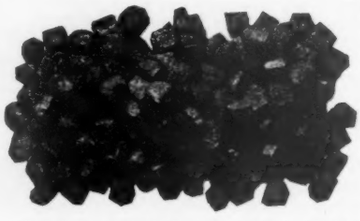
Exclusive Users

American Well & Prospecting Co.
Boykin Machinery & Supply Co.
Hopper Machine Co.
Latex Iron & Steel Works, Inc.
Lucey Manufacturing Co.
Lee C. Moore & Co.
Oil Well Supply Co.
Portable Rotary Rig Co.
Star Drilling Machine Co.

Natural Gas Financing

G. E. BARRETT & CO.
Incorporated
120 Broadway New York

HARRY A. CAMPBELL F. LEE STEWART
NATIONAL PETROLEUM ENGINEERING COMPANY
ENGINEERS AND GEOLOGISTS
ATLAS LIFE BUILDING
TULSA, OKLAHOMA
APPRAISALS
REPORTS, COMMERCIAL AND TAX
SURVEYS
ESTIMATES OF OIL RESERVES

U. S. INDUSTRIAL DIAMOND CORP.
475 Fifth Ave., New York

Importers of all varieties of Industrial Diamonds
Carbon (Black Diamond) and Bort (Crystalline Diamond) for Diamond Core Drilling
Best shapes and qualities always in stock.
Parcels for examination and selection will be sent on request to reliable firms.

BE AMONG THE BEST INFORMED OIL MEN

Read The Oil and Gas Journal every week.

It will keep you reliably informed and provide you with information not obtainable elsewhere.

CARBON (BLACK DIAMONDS)
FOR DIAMOND CORE DRILLS

IMPORTERS
INDUSTRIAL DIAMONDS
MANUFACTURERS
DIAMOND POINTED TOOLS FOR ALL MECHANICAL PURPOSES
WRITE OR WIRE FOR CATALOGUE AND FULL PARTICULARS
THE DIAMOND DRILL CARBON CO.
61 PARK ROW, NEW YORK, N.Y. CABLE ADDRESS, CREDOTAN, N.Y.

SKINNER Clamps
stop leaks
Send for Catalog
M. B. SKINNER CO., 562 Washington Boulevard, CHICAGO

Morrell and Egloff[8] estimate a saving in excess of $50,000,000 per year in the United States in connection with this one specification alone.

In addition to the above process economies, conservation can best be advanced by proper efforts for the elimination of unnecessary specifications, and by conservation of the crude oil supply, withdrawing from underground only those supplies of crude oil necessary to furnish motor fuel made by the most efficient method of production, i.e., by cracking, leaving a limited reserve for the production of other petroleum products. This does not mean abatement of the activities of crude oil finding and recovery, but rather a curb upon excessive production with its consequent economic losses resulting from excess storage and damage to oil pools.

[8]Institute of Mining & Metallurgical Engineering, February 14-17, 1927, New York City, N. Y.

PETROLEUM RESOURCES OF BOLIVIA AND OUTLOOK OF THE INDUSTRY

By Ernesto Barth*
La Paz, Bolivia

As to the geographical distribution of petroleum in Bolivia, there are, properly speaking, three oil districts, the one east of the Andean slopes, the central Andean district, including the plateau between Cordillera Occidental de los Andes and Cordillera Real and the low land of the Beni district. The central Andean district includes all of the territory on the Bolivian plateau; the district east of the Andean slopes, all of the territory along the foothills of the East Andes; the Beni district, all of the territory de Colonias and Beni These districts may merge in places but it forms a convenient grouping for consideration of the present knowledge.

Geologic Inferences

The geological conditions of Bolivia have been little studied from the standpoint of oil occurrence, though some big oil companies have sent their geologists to Bolivia to study the petrol-geologic conditions here; the results not being available for publication. We know that practically all the great oil-bearing rock series of the world exist in Bolivia, and since important oil seepages also exist, we may expect the development of enormous fields. Strata of Carboniferous, Cretaceous and Tertiary ages, which yield oil in North America and Europe, may be expected to do so likewise in Bolivia.

The oil-bearing areas of most importance in this country are the foothills of the East Andean slopes in the departments of Tarija, Chuquisaca, Santa Cruz, Cochabamba, Beni and the northwest territory. For many years there has been an expectation that commercial bodies of oil will be found at some places along the belt of foothills which stretches from the boundary of southern Bolivia north-northwestward to and beyond Santa Cruz, or in the plains which lie some distance to the east of the foothills. The occurrences of oil seepages in these mentioned departments, besides the outcropping of tar sands, gave evidence that this great stretch of country was at least potentially oil bearing if suitable structure of the rocks would permit it to accumulate in commercial quantities. Such conditions induced the Standard Oil Co., which is the only company so far, to begin drilling on a large scale. The territory covered by the prospecting and development work includes an area more than 600 kilometers with an average width of about 100 kilometers.

The central Andean district of Bolivia is of less importance, as in general the geology of this district is not supposed to favor large pools. Oil, if present, will probably be in the Cretaceous or in older palaeozoic formations. Chances for oil from the Tertiary seem slight as the petroliferous rocks of Tertiary age which originally covered all of Bolivia have been done away with, all but remnants, in the Andean region by the uplift of the Andes Mountains in late Tertiary time. While it is known that the structural conditions of this district are somewhat complicated, it is believed that exploitations based on a careful interpretation of the geology of this region will eventually yield commercial production of at least modest proportion.

A well which was drilled by the Compania Caupolican y Calacoto in the district of Pacajes near General Perez did not meet with success. This failure to get oil does not mean that no oil is present, as several seepages are known to exist and the well was located without regard to the principles of petroleum geology.

The Beni district, including the great plains and the territory of Colonias, are covered by a fill of Quaternary, Aeolian deposits and Alluvium, so that the structure in this practically flat country can not be mapped by surface observations and nothing can be said as to the future oil possibilities of this district, although oil seepages are known to exist in many places.

Out of this vast territory along the foothills of the East Andes, which has an extension of about 750 miles, the southeast part or Chaco Oriental is best known today. This district is covered by a blanket lease of the Standard Oil Co. comprising about 5,000,000 acres.

Character of Country

The west end of the Chaco Oriental is an area having numerous rugged parallel ranges of hills rising 600 to 1,500 meters above mean sea level with relatively narrow valleys between the ranges. The hills roughly indicate structural conditions such as anticlines and domes; the valleys are mainly synclinal or cut in the sides of anticlines or along the plunging noses of folds. Most all ranges are heavily timbered. The valleys are cultivated and are clear of heavy timber. Exposure of rocks can be found readily along stream beds and in the small quebradas, where often bluff-like exposures occur. Geological work, however, is by no means easy. Plane table surveys are not practicable in most of the area nor are such surveys necessary to delineate the structure. Strike and dip symbols and formation contacts are most efficient for mapping structure here.

Accessibility

The accessibility and transport facilities to the various points where drilling sites may be selected is rather a grave problem. The nearest railroad town is Tartagal, Argentine, at the present time. However, the line to the frontier town of Yacuiba, Bolivia, is under construction and will probably be finished this year. From Yacuiba a national road leads northward up to Santa Cruz de la Sierra. Many great rivers, as Pilcomayo, Parapeti and Rio Grande, have to be forded, as bridges are not in existence. During the rainy season it is almost impossible to cross these rivers. For locations off the main road special roads must be constructed to get the drilling equipment on the ground. Drilling operations can be carried on all year. The climate is subtropical and by a normal manner of living not unhealthy, although there is much malaria (Terciana) which causes 75 per cent of all the illness observed.

Surface Oil and Gas Indications

Oil and gas seepages are found in numerous places of this region. Only in the first mountain range west of Yacuiba up to Santa Cruz de la Sierra, 26 oil seepages are known to exist. In general it may be said that every 16 kilometers an oil seepage exists. Some of these seepages produced so much oil that shafts were sunk and "Minas de Petroleo" ex-

*Direccion General de Minas y Petroleo, Bolivia.

This Lucey chain of National Distributors assures bigger and better Rotary Service throughout the Continental Oil Fields

Wherever LUCEY there's Oil

Bridgeport Machinery Company
Seminole, Okla.

International Supply Co.
Wewoka, Okla.

T. T. Word Supply Co.
Houston, Texas

The Latest Link in the ever lengthening chain of Lucey distributors

The Bridgeport Machine Company of Wichita, Kansas, being impressed with the outstanding merits of Lucey Oil Field Products, was recently made a Lucey distributor handling the entire Rotary Line and carrying complete stocks at Seminole, Oklahoma in order to give Lucey users the finest possible service.

International Supply Co.
Tonkawa, Okla.

Bradford Supply Co.
Wichita Falls, Texas

International Supply Co.
Seminole, Okla.

T. T. Word Supply Co.
Shreveport, La.

Lucey Products Corp.
Domestic Sales Office—
224 E. Brady St.
Tulsa, Okla.
Export Sales Office—
3505 Woolworth Bldg.
New York, N. Y.

NOW Lucey Products are within easy reach of every Drilling Operator in the United States

Whether you need an entire Rotary outfit, or crown block or merely a tool joint you can now get this time tried, dependable Lucey equipment in double quick time to meet any emergency.

A telegram or telephone call to your nearest Lucey distributor is all that is neccessary.

Why not send to your local Lucey Distributor today for the latest facts about Lucey oil field equipment.

Lucey Manufacturing Corporation of Tennessee

Chattanooga, Tennessee

Simplex Emergency Jack No. 310

No. 310—Capacity 15 tons
Single acting—automatic lowering

No. 310 is known as the Jack of a hundred uses. A standby in every oil field. Operates at any angle or vertically.

Built with drop forged steel working parts and furnished with five foot steel chain—steel auxiliary claw and steel level bar.

Unsurpassed for extricating stalled motor trucks—jacking steam engines—raising and setting boilers, raising sand reels and casing sills, skidding rigs and moving tanks and heavy machinery.

Templeton, Kenly & Co., Ltd.
Established 1899
Sole Manufacturers of the Simplex Jacks
Chicago, Ill., U.S.A.

Simplex Jacks are extensively imitated but they never have been equaled in man-power, simplicity, stability or safety.

At Your Supply House

tablished years ago, the oil being used for various causes.

Stratigraphy

The stratigraphy of the Chaco Oriental is a great study for itself and will require a long period of careful work till we come to final conclusions as to the exact differentiation of the different formations. The possible oil-producing horizons are the lower Cretaceous and the Devonian. Oil has been found in the Tertiary, but the writer believes this is migratory.

The stratigraphic column may be divided into the following sections:

1. Terciario superior y cuaternario
2. Terciario subandino
3. Horizonte calcare-dolomitico y Areniscas superiores (Cretacico)
4. Permo-triasico (Areniscas inferiores)
5. Devonico.

1. Terciario superior y cuaternario: These deposits consist mostly of clays, conglomerates, gravel-terraces and aeolian deposits with a typical pampa fauna.

2. Terciario Subandino: Deposits of soft, fine-grained sandstones, interbedded with white clays more compact and resistent as the upper horizon.

3. Horizonte Calcareo-dolomitico: These deposits of red sandstones and gypsiferous shales, well exposed in the extreme part of the State (Bermejo) are the continuation of the "formation petrolifera" in Argentine. One can determine three main deposits of this formation: (1) A heavy bedded sandstone at the base; (2) A system of different shales with gypsum layers, limestone and dolomite; (3) An upper sandstone with a greater thickness as the lower one.

These deposits may have a total thickness of 1,000 meters or more. They were first thought of to be of Triassic or Permian age, but recent investigations show, (especially by Steinman) that they are more than likely of Cretaceous age. One can very often find at the base tuffs of porphyrites which would rather indicate a young Mesozoic age.

4. Permo-Triasico: These horizons have not been positively established.

5. Devonico: D'Orbigny already divided this horizon in Bolivia into: (1) A lower horizon, fossiliferous, consisting of micaceous sandstones, slate and schists of dark gray color, or dark brown color, sometimes ferriferous; (2) An upper horizon, without fossils, consisting of gray sandstones sometimes yellowish or red, more or less hard in benches and layers.

The total thickness of this formation may be 300-900 meters. In a few places, especially where faults occur, seepages of petroleum are present.

Structure

A study of structure in this area is made very difficult by reason of heavy timber present which covers almost the entire area. The writer had occasion to visit only the first mountain range to the west on the road from Yacuiba to Santa Cruz. Generally speaking, the prevailing dip is to the east, but local conditions caused many variations such as domes, anticlines and faults. The district abounds in a wealth of structures which cut across the normal dip which is southeast. In general, the long axis of the structures run in a north-south (northeast-southwest) direction. There are considerable evidences of minor structures.

Development

The Standard Oil Co., which is doing development work in this vast territory, has drilled or is drilling up to this time about 16 wells, all of which were drilled on structures, either anticlines, domes or along fault lines. Some of these wells had to be abandoned owing to difficulties encountered in wildcat territory. From the producing wells, I shall refer here only to three of them which lie a great distance apart from each other.

No. 1 Saipuru is located on the Taputa Dome, on the Parapeti Concession, quebrada of Taputa, Province of Cordillera, Department of Santa Cruz. The first producing sand was encountered at a depth of 256-68 feet. This sand was cased off and drilling continued. At 495-507 feet another oil and gas sand was encountered with a daily capacity of 800 bbls. Finally a third oil and gas sand was encountered at a depth of 2,060-75 feet.

No. 1 San Andite is located on Lot No. 7, Province of Gran Chaco, Department of Tarija. It was started in August, 1925. At 130 meters a sand was encountered with an estimated production of about 40 bbls.

No. 2 Bermejo is located on an anticline, on the banks of the Rio Bermejo, Province of Gran Chaco, Department of Tarija. On September 2, 1924, the well was finished at a total depth of 573 meters and was considered having an initial production of 1,500 bbls.

All the producing wells are shut in at present and more territory is being tested. Practically all the folds on which the Standard Oil Co. is drilling now have ample closure to provide for oil accumulation, providing hydrostatic conditions are favorable in the oil horizon. From a structural standpoint, the Caco Oriental offers reasonable possibilities as an oil-producing district.

Conclusions

Regarding the future outlook of the petroleum industry in Bolivia, the following may be said from a geological point of view:

1. Positive surface evidence of oil and gas exists in the whole territory between the Argentine frontier and the northwest territory bordering Peru, and oil and gas has already been found in commercial quantities in wells of the Standard Oil Co.

2. That favorable stratigraphic conditions such as good sands and organic shales exist.

3. That such bends can be reached with the drill.

4. That there are good structures (anticlines, domes, etc.) to concentrate oil.

5. That the areas are accessible.

6. That similar geologic conditions exist on the whole extension of the foothills of the East Andes.

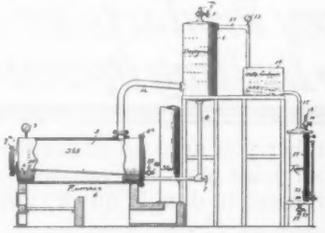
All this evidence leads to the conclusion that the whole area is well worth testing for oil and gas.

From an industrial standpoint it may be added that at present Bolivia is obtaining its oil from foreign countries. The finding of commercial oil and gas fields in Bolivia means much for the future of this State. It means cheaper fuel for domestic heating and for industrial purposes and should give a manufacturing impetus that would be far-reaching in its effect.

For these reasons, the search for oil and gas is well justified.

Recent Patents

1,638,113. Process for Cracking Oils. Carbon P. Dubbs, Wilmette, Ill., assignor to Universal Oil Products Co., Chicago, a corporation of South Dakota. Filed February 17, 1921, Serial No. 445,671. Renewed March 24, 1927. 5 Claims. (Cl. 196—48.)



1. A process for cracking hydrocarbon oil, consisting in converting the oil at a cracking temperature in a reacting chamber, dephlegmating and condensing the generated vapors, returning the reflux and causing it to be introduced and flow through the zone of highest temperature in said reacting chamber, circulating the oil to promote conversion in the upper part of said chamber and collecting the precipitated carbon in the interior of the chamber and out of contact with the lower heated portion thereof.

KORK KELLEY
Pipe Line Contractor
Any Size—Any Length
Amarillo—Borger, Texas

S. F. SHAW
Mining Engineer
Consulting Work in Air and Gas Lifts
301 Terrell Road,
San Antonio, Texas

Original Eotvos Torsion Balances
Sold or Rented
GEORGE STEINER
330 Houston Post-Dispatch Building,
HOUSTON, TEXAS

REED & COLE
CONTRACTORS
Grading and Hauling
Steel Tank Construction
318 Atlas Bldg., Tulsa, Okla.

GEORGE K. STAYTON
Attorney at Law
Oil and Gas and Land Practice
in Winkler County Field
Pyote, Texas

ARTHUR C. BROWN
SOLICITOR OF UNITED STATES AND FOREIGN PATENTS
406-412 KENNEDY BLDG.
Tulsa, Okla.
Mr. Fred Krueger
in Charge
Phone 4-2319

Cables: Ceallach, New York
Telephone: Whitehall 8256
JOHN EOGHAN KELLY
Consulting Engineer
17 Battery Place, New York City, N. Y.
Pasaje Coloma 6, Gautemala, C. A.
Examination, appraisal, management, negotiation of petroleum properties, mines, natural resources. Exceptional facilities in Latin America.

EDWIN B. HOPKINS
CONSULTING GEOLOGIST
25 Broadway
NEW YORK

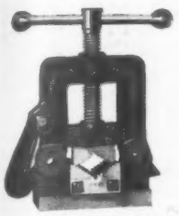
PHILLIP MAVERICK
PETROLEUM GEOLOGIST
Telephone 93
Ricker & Dodson Bldg.
SAN ANGELO, TEXAS

Chester W. Washburne
Geologist and Engineer
27 William St., N. Y.

PATENTS *Write for Free Book*
MUNN & CO.
Associated for 81 years with the Scientific American
1551 Scientific American Building
24 West 40th Street, *New York City*
514 Scientific American Bldg., *Washington, D.C.*
1303 Tower Building, *Chicago, Ill.*
656 Hobart Building, *San Francisco, Cal.*
511 Van Nuys Building, *Los Angeles, Cal.*

TEXAS OIL MAPS
County and District
Catalog on Application
HEYDRICK MAPPING COMPANY
Wichita Falls, Texas

Armstrong Bros. Quality Tools Satisfy Best!

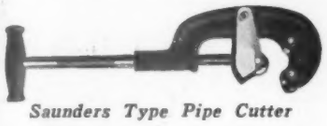


Standard Pipe Vise

With thirty-five years of fine tool making as a background, ARMSTRONG BROS. Quality Pipe Tools meet every standard which has been set by experienced pipe tool users. Mechanics who are using tools daily under the hardest conditions invariably prefer ARMSTRONG BROS. Tools because of their satisfactory service and lasting wear.

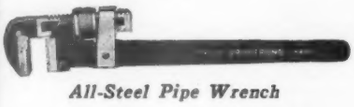
Buy tools that you can depend on. They're the most economical in the long run. Cut down costs by purchasing ARMSTRONG BROS. Quality Tools—with an unqualified Guarantee behind them.

Chain Pipe Vise



Saunders Type Pipe Cutter

Solid Stock and Dies



All-Steel Pipe Wrench

ARMSTRONG Chain Pipe Wrench

Built to "stand the gaff" on the toughest work.

Jaws are drop-forged from special steel, heat-treated, hardened and tested for toughness. Handles are forged from high carbon steel. The chains are of highest quality and each flat link chain is proof-tested. Nine sizes—for ⅛ to 18 inch pipe.

Write today for your copy of our new Pipe Tool Catalog showing descriptions, sizes and prices on the complete ARMSTRONG BROS. Line. *Sent free on your request.*

ARMSTRONG BROS. TOOL CO.

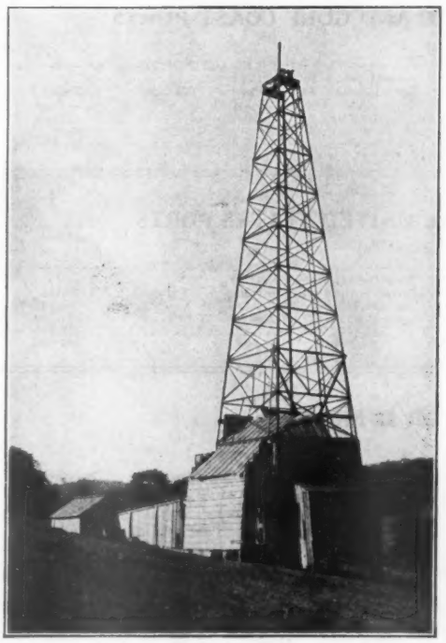
"The Tool Holder People"

330 N. Francisco Ave. Chicago, U. S. A.

Barnes Type Pipe Cutter

Adjustable Stock and Dies

The ARMSTRONG TRADE MARK *is your best guarantee of highest quality materials, superior design and excellent workmanship.*



Why experiment?
O'Brien Derricks Will Drill Your Well and Pull the Casing

HERE

is a Real Derrick!

(*Ask the men who have put 'em up*)

Hasty erection of derricks and speedy rigging up cause many a crooked hole and the resultant important expenses and losses. O'Briens can be erected with less chance of drilling grief and pumping perplexities. Ask the men who have put 'em up.

The O'Brien is not a cheap derrick. It is an economical one. The purchase of an O'Brien Derrick is an investment in definite use and practical indestructibility.

O'BRIEN Steel Construction Company, Inc.

WASHINGTON, PENNA.

Western Representative:

RIG EQUIPMENT COMPANY, 1524 So. St. Louis St., Tulsa, Okla.

Carried in Stock at Earlsboro, Oklahoma

Oklahoma-Kansas and Eastern Pipe Line Report

OKLAHOMA-KANSAS

Pipe Line Statement for June

Company—	Month	Daily Av.
*Prairie P. L. Co.	4,440,000	148,000
Gulf P. L. Co.	1,330,590	44,353
Texas P. L. Co.	853,625	28,454
Magnolia Pet. Co.	1,716,829	57,228
Empire P. L. Co.	1,826,981	60,899
Cosden P. L. Co.	971,624	32,387
Sinclair P. L. Co.	2,415,990	80,503
*Other lines	12,720,000	424,000
Total June	26,264,739	875,824
Total May	26,935,013	868,870
Difference	670,274	6,954

Shipments

*Prairie P. L. Co.	5,505,552	183,518
Gulf P. L. Co.	1,122,928	37,431
Texas P. L. Co.	725,638	24,188
Magnolia Pet. Co.	1,206,159	40,205
Empire P. L. Co.	1,253,736	41,791
Cosden P. L. Co.	826,072	27,536
‡Sinclair P. L. Co.	2,633,047	87,768
*Other lines	12,000,000	400,000
Total June	25,273,132	842,437
Total May	25,887,274	835,073
Difference	614,142	7,364

Stocks

*Prairie O. & G. Co.	30,300,000
*Prairie P. L. Co.	2,000,000
Gypsy Oil Co. & Gulf P. L. Co.	8,761,873
The Texas Company	4,723,332
Magnolia Pet. Co.	5,611,652
Empire P. L. Co.	3,277,315
Cosden P. L. Co.	2,915,742
*Sinclair Crude Oil Pur. Co.	19,600,000
Carter Oil Co.	15,538,629
*Other lines	10,650,000
Total June	103,378,545
Total May	101,197,942
Difference	2,180,602

*Estimated. ‡Prairie Pipe Line shipments include Texas crude and Sinclair Pipe Line shipments include Wyoming, Texas crude. Note—Stocks do not include approximately 4,000,000 bbls. of crude oil held in storage on private tank farms and leases and approximately 1,700,000 bbls. of Texas Panhandle crude in storage in Oklahoma and Kansas.

EASTERN PIPE LINES

Runs From Wells

In the following table will be found the regular receipts from wells by various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for June and July:

	June, '27	July, '27
Nat. Transit	157,315.01	155,782.70
S. W. Pa. P. L.	93,809.85	85,622.93
Eureka P. L.	390,791.12	378,082.34
Buckeye P. L. (Macksburg)	344,562.31	319,986.23
Buckeye P. L. (Cleve)	11,529.52	11,219.55
Buckeye P. L. (Lima, etc.)	139,035.28	126,613.83
Indiana P. L.	11,406.99	9,105.05
Cum'land P. L.	250,266.24	261,877.90
N. Y. Transit	24,809.81	22,074.99
Tidewater P. L.	189,396.14	185,203.73
Pure Oil	167,510.92	157,734.23
Emery P. L.	55,995.64	54,627.01
Paragon Dev.	26,293.82	28,094.42
Pgh. P. L.	5,710.36	5,520.99
Stoll Oil Ref.	13,632.37	14,258.01
Total	1,882,695.38	1,815,803.91
Daily average	62,756.51	58,574.32

Note—Indiana Refining Co. also reported other receipts of 416,243.11 bbls. Paragon Refining Co. had other receipts of 171,247.26 bbls. Paragon Development had other receipts of 1,492.08 bbls. Pure Oil had other receipts of 21,717.04 bbls.

Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for June and July:

	June, '27	July, '27
Nat. Transit	307,649.33	330,044.32
S. W. Pa. P. L.	317,891.14	363,850.84
Eureka P. L.	181,937.70	183,351.51
Buckeye P. L. (Macksburg)	165,198.17	175,567.01
Buckeye P. L. (Cleve)	971.56	971.94
Buckeye P. L. (Lima, etc.)	930,510.43	954,040.89
Indiana P. L.	975,616.39	1,038,598.35
Cum'land P. L.	150,959.91	139,659.15
N. Y. Transit	315,171.90	364,628.63
Northern P. L.	187,632.30	200,019.17
Tidewater P. L.	139,216.41	106,016.04
Pure Oil	163,634.33	165,167.59
Emery P. L.	54,410.09	57,048.51
Paragon Ref.	171,015.11	176,876.31
Indian Ref.	394,690.00	400,446.10
Paragon Dev.	29,986.53	29,982.32
Pgh. P. L.	6,384.84	5,593.34
Total	4,493,146.29	4,691,862.02
Daily average	149,771.54	151,350.39

Gross Stocks

The gross stocks held by various pipe lines in the oil-producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky, at the close of June and July:

	June, '27	July, '27
Nat. Transit	1,150,482.45	1,137,052.50
S. W. Pa. P. L.	705,827.92	684,337.22
Eureka P. L.	1,760,893.31	1,859,908.44
Buckeye P. L. (Macksburg)	450,027.81	407,391.62
Buckeye P. L. (Cleve)	38,348.14	36,605.62
Buckeye P. L. (Lima, etc.)	4,303,614.65	4,280,952.96
Indiana P. L.	535,161.78	618,014.38
Cum'land P. L.	581,519.53	579,849.28
Southern P. L.	406,472.60	433,210.34
N. Y. Transit	513,088.14	419,558.02
Northern P. L.	509,881.48	487,732.61
Pure Oil	397,272.76	412,670.10
Emery P. L.	9,961.99	7,901.54
Paragon Ref.	24,515.54	18,557.87
Indian Ref.	45,531.36	58,707.96
Paragon Dev.	6,969.48	6,514.28
Pgh. P. L.	4,104.27	4,163.23
Total	11,493,673.21	11,453,127.97
Increase	134,291.93	*40,545.24

*Decrease.

Grades of Oil

The following table shows the amount of the different grades of oil held by the eastern pipe lines at the close of June and July showing the gross stocks of the above fields:

	June, '27	July, '27
Penna.	4,097,743.11	4,190,178.95
Lima	939,796.06	1,006,906.85
Kentucky	1,190,128.39	1,129,805.76
Mid-Continent	5,233,298.35	5,079,649.41
Illinois	32,706.30	46,587.00
Total	11,493,673.21	11,453,127.97

Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil fields for the past four years:

	1924	1925	1926	1927
Jan.	62,638	56,831	55,630	56,209
Feb.	68,023	60,606	60,394	61,298
March	68,721	60,575	61,644	63,247
April	71,058	63,062	63,019	60,337
May	63,942	59,217	60,580	60,284
June	63,230	61,270	64,131	62,757
July	64,208	62,639	63,206	58,674
Aug.	59,942	59,686	61,815	.....
Sept.	62,930	62,510	64,639	.....
Oct.	64,976	60,995	62,704	.....
Nov.	56,282	59,350	61,774	.....
Dec.	55,814	57,974	58,755	.....

Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima, and other fields for the past four years:

	1924	1925	1926	1927
Jan.	145,518	157,889	156,056	141,227
Feb.	148,732	160,863	159,488	138,534
March	147,098	154,591	150,239	133,777
April	147,611	151,429	152,371	140,227
May	134,997	146,995	160,998	144,894
June	143,010	149,467	160,267	149,772
July	124,137	161,338	160,945	151,350
Aug.	123,120	161,730	151,929	.....
Sept.	127,325	156,719	158,915	.....
Oct.	123,170	145,388	161,132	.....
Nov.	124,400	143,582	152,668	.....
Dec.	151,392	150,162	136,428	.....

Gross Stocks

In the following table will be found the gross stocks of the various lines of the Pennsylvania, Lima and Kentucky oil fields, including oil received from other lines at the close of each month for the past three years:

	1925	1926	1927
Jan.	11,353,276	9,859,170	9,718,001
Feb.	11,192,924	9,579,354	10,119,163
March	11,158,297	9,438,292	10,794,944
April	11,062,082	9,805,851	11,112,296
May	11,207,562	9,531,757	11,359,381
June	11,093,796	9,585,904	11,493,673
July	11,067,453	9,734,687	11,453,128
Aug.	10,974,481	9,665,947	.....
Sept.	10,781,753	9,433,732	.....
Oct.	11,086,850	9,269,806	.....
Nov.	11,068,158	9,257,667	.....
Dec.	10,458,445	9,454,512	.....

Franklin Pipe Line Co.

The following table exhibits the condition of the Franklin Pipe Line at the close of business for the months named and not counted in the stocks and averages reported above.

	Runs	Shipments	Stocks
1926—			
July	3,025.86	4,075.11	13,809.18
August	2,886.59	2,121.21	14,574.56
Sept.	2,788.18	3,373.06	13,985.68
Oct.	2,991.86	2,307.75	14,671.25
Nov.	2,810.60	1,664.55	15,817.31
Dec.	2,847.52	5,561.11	13,103.72
1927—			
Jan.	2,641.54	1,470.42	14,274.84
Feb.	2,764.30	1,082.82	15,956.32
March	2,587.20	1,878.56	16,664.96
April	2,834.23	1,512.65	17,986.54
May	2,768.47	539.29	20,215.72
June	2,946.29	664.40	22,497.61
July	3,153.39	1,276.61	24,374.39

The Illinois Field

The following table gives the report of the Illinois Pipe Line Co. in Illinois:

Gross stocks, Aug. 1	1,996,959.35
Runs from wells	586,760.95
Other receipts	363,319.17
Regular deliveries	449,726.36
Other deliveries	556,098.36

The amount of Illinois oil run by the Tidewater Pipe Co. in July was 27,140.35 bbls. and deliveries were 36,175.67 bbls. Adding these figures to those of the Illinois Pipe Line Co. makes the runs and deliveries as follows:

1926—	Runs	Deliveries
July	713,490.66	490,092.83
August	701,795.92	555,766.59
September	688,798.66	616,083.05
October	681,648.96	531,467.39
November	651,263.33	498,439.37
December	668,909.58	587,947.61
1927—		
January	621,421.03	530,085.98
February	595,831.16	476,950.71
March	727,593.91	554,947.43
April	593,225.97	444,818.49
May	728,759.40	543,192.02
June	640,975.85	532,217.78
July	613,901.30	484,902.53

Tidewater Pipe Co., Ltd., also delivered in July, 138,158.92.

AVERAGE DAILY RECEIPTS OF CALIFORNIA OIL AT ATLANTIC AND GULF COAST PORTS

Average bbls. per day—	ATLANTIC PORTS: Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS: Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total All Ports
April	12,667	4,367	47,667	15,100	13,300	93,100	.....	.. ..	.....	.....	.....	93,100
May	10,452	7,645	18,387	9,226	6,226	51,935	.....	.....	.....	.....	.....	51,935
June	25,567	11,223	48,833	17,367	17,367	120,367	.....	.....	.....	.....	.....	120,367
July	13,484	17,290	33,065	9,129	5,452	78,419	.....	.....	.....	.....	968	79,387

AVERAGE DAILY IMPORTS OF PETROLEUM AT PRINCIPAL UNITED STATES PORTS

Average bbls. per day—	ATLANTIC PORTS: Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS: Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total All Ports
April	22,700	9,033	62,033	6,067	26,567	126,400	5,067	18,033	.....	.....	23,100	149,500
May	21,032	9,807	93,452	7,774	33,580	156,645	1,807	30,612	1,936	.....	34,355	190,000
June	18,167	9,700	83,867	10,900	16,567	139,200	2,000	31,800	.....	.....	33,800	173,000
July	22,226	10,387	80,194	7,194	38,710	158,710	3,226	25,064	806	.....	29,096	187,806

GROSS PRODUCTION OF THE UNITED STATES FOR 12 MONTHS

(IN BARRELS)

1926—		California	Oklahoma	Texas	Kansas	Arkansas	Louisiana	Rocky Mountains	Eastern Fields	Total
July:	Month	18,743,199	14,657,483	13,983,759	3,582,267	5,019,893	2,173,813	3,336,664	3,420,000	64,917,078
	Daily average	604,619	473,322	451,089	115,575	161,932	70,122	107,634	110,323	2,094,099
August:	Month	18,765,080	14,618,236	17,093,586	3,681,426	4,878,191	3,190,739	3,467,697	3,339,500	68,024,485
	Daily average	605,325	471,556	551,406	118,756	157,361	73,896	111,838	107,726	2,194,338
September:	Month	18,104,954	14,466,510	17,580,100	3,450,060	4,603,230	2,079,840	3,141,123	3,330,000	66,756,817
	Daily average	603,498	482,217	586,003	115,002	153,441	69,328	104,704	111,000	2,225,194
October:	Month	18,966,058	15,730,889	19,001,388	3,714,637	4,625,128	2,166,559	3,071,720	3,396,000	70,654,189
	Daily average	611,808	507,119	612,948	119,827	149,198	69,889	99,088	109,613	2,279,490
November:	Month	19,173,128	16,876,950	18,593,160	3,592,490	4,299,480	2,064,911	2,842,587	3,216,000	70,649,706
	Daily average	639,104	562,565	619,772	119,783	143,316	68,497	94,752	107,200	2,354,990
December:	Month	20,276,950	17,582,908	19,752,591	3,664,156	4,266,189	2,018,734	2,658,201	3,313,000	73,823,829
	Daily average	654,095	576,868	637,212	117,876	137,619	65,120	85,752	106,871	2,381,414
1927—										
January:	Month	20,184,872	19,035,426	18,605,263	3,769,879	4,076,469	1,905,570	2,620,302	3,332,500	73,530,383
	Daily average	651,125	614,046	600,173	121,609	131,499	61,470	84,203	107,500	2,371,948
February:	Month	17,982,711	19,752,340	16,483,712	3,352,076	3,574,256	1,784,104	2,388,135	3,007,200	68,321,543
	Daily average	642,240	705,441	588,704	119,717	127,652	63,718	85,183	107,400	2,440,057
March:	Month	19,835,724	22,480,921	18,232,617	3,675,143	3,853,920	2,032,982	2,476,798	3,335,800	76,923,905
	Daily average	639,862	725,191	588,149	118,553	124,320	65,580	79,574	106,100	2,449,158
April:	Month	19,493,825	22,308,130	17,801,140	3,516,930	3,378,240	1,994,330	2,615,770	3,474,000	74,483,365
	Daily average	648,870	740,271	593,371	117,231	112,608	66,491	87,193	115,800	2,482,745
May:	Month	19,506,054	23,256,463	19,539,083	3,704,314	3,493,689	1,935,175	2,742,588	3,467,000	77,646,346
	Daily average	629,238	750,273	630,293	119,494	112,699	62,425	88,471	111,839	2,504,721
June:	Month	19,181,443	22,830,330	18,399,810	3,487,580	3,366,760	1,880,320	2,592,487	3,330,000	75,018,379
	Daily average	639,381	761,011	613,327	114,586	112,192	62,694	86,414	111,000	2,500,606
Total 12 months		230,213,997	223,788,393	215,067,309	43,131,968	49,434,434	24,217,577	33,941,123	39,963,000	859,757,801

Fittings

GASO GRAY
IRON TEE

GASO GRAY
IRON ELL

GASO BECKWITH SWING
CHECK VALVE

GASO PIPE LINE STRAINER

You will like Gaso Fittings. They are made in Gaso shops by Gaso men under Gaso standards of workmanship—which is simply another way of saying absolute and unvarying dependability,

• • • The iron in Gaso Fittings is close-grained and free from imperfections—the machining, painstaking and carefully inspected. Every item in the Gaso line is unreservedly guaranteed.

• • • In addition to a large line of standard fittings, we are enabled by a modern pattern shop and foundry to quote on special requirements.

Our engineering department is at your service.

GASO PUMP & BURNER MFG. CO.
Tulsa · Oklahoma

GASO PUMPS
for every oil industry need

BEING thoroughly in accord with the standardization efforts of the American Petroleum Institute, The Hughes Tool Company will manufacture and stock all sizes of Hughes Tool Joints, made to A. P. I. specifications.

Remember—
Hughes Tool Joints Cost No More—But
Do Last Longer

HUGHES TOOL COMPANY

Service Plants	*Main Office and Plant*	*Export Office*
Los Angeles, Calif. Oklahoma City, Okla.	HOUSTON TEXAS	Woolworth Bldg. New York City, N. Y.